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U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF PLANT INDUSTRY—BULLETIN NO. 188.

B. T. GALLOWAY, *Chief of Bureau.*

DRY FARMING IN RELATION TO RAINFALL AND EVAPORATION.

BY

LYMAN J. BRIGGS,

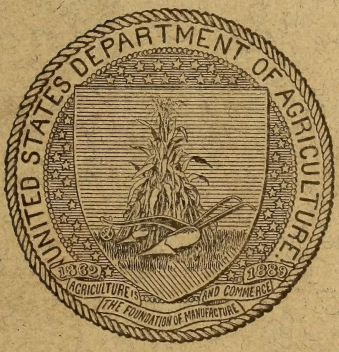
PHYSICIST IN CHARGE OF PHYSICAL INVESTIGATIONS,

AND

J. O. BELZ,

ASSISTANT IN PHYSICAL INVESTIGATIONS.

ISSUED NOVEMBER 5, 1910.



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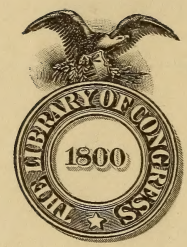

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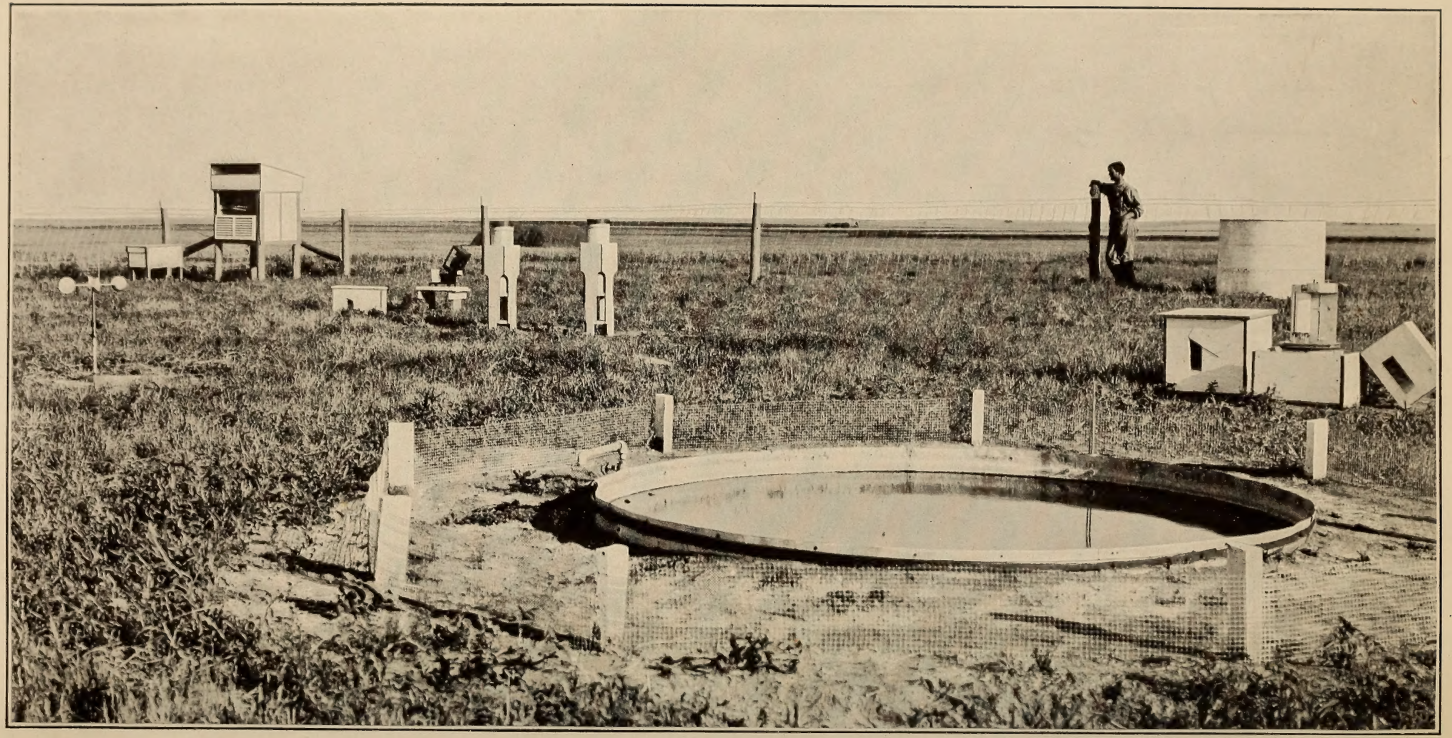

THE INSTRUMENT INCLOSURE AT THE HAYS EXPERIMENT FARM, HAYS, KANS.

The evaporation tank is shown in the foreground, with the recording evaporation gauge on the right. The rain gauge and hail gauge are shown in the center of the picture. The other instruments shown are for recording the temperature of the air and of the soil and the velocity of the wind.

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BUREAU OF PLANT INDUSTRY—BULLETIN NO. 188.

B. T. GALLOWAY, *Chief of Bureau.*

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BUREAU OF PLANT INDUSTRY.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Office of Chief of Bureau,
Washington, D. C., June 9, 1910.

Sir: I have the honor to transmit herewith and to recommend for publication as Bulletin No. 188 of the series of this Bureau the accompanying manuscript, entitled "Dry Farming in Relation to Rainfall and Evaporation," by Dr. L. J. Briggs and Mr. J. O. Belz, of the Office of Physical Investigations of this Bureau.

This manuscript has been prepared for the guidance of prospective settlers in regions of limited rainfall, and contains a discussion of the relation of the quantity and character of the rainfall and of the evaporation to crop production under dry-farming methods in various sections of the Western States. Tables showing the normal rainfall for these States have also been compiled from the numerous publications of the Weather Bureau, and are appended for the convenience of prospective settlers. The writers desire to express their obligations to the United States Weather Bureau, and particularly to Mr. P. C. Day, of the Climatological Division, for assistance in the preparation of these tables. The illustrations, 24 in number, consisting mainly of state rainfall maps, have been specially prepared by the writers in order that the distribution of the rainfall in each State may be more readily understood.

Respectfully,

G. H. Powell,
Acting Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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DRY FARMING IN RELATION TO RAINFALL AND EVAPORATION.

INTRODUCTION.

This bulletin contains a discussion of dry farming in relation to the amount and character of the rainfall and evaporation in the western United States. Usually in discussing dry-farming conditions the annual precipitation is the only feature of the rainfall that receives attention. But there are other factors in connection with the rainfall that have much to do with the successful production of crops. The seasonal distribution of the rain, the rate at which the rain falls, and the amount of rain that is lost through run-off from the surface all have an important part in determining the percentage of the total rainfall that is really available for the use of crops. Finally, the amount of evaporation which takes place during the growing season determines to some extent the amount of rain that is needed to produce a crop, and this varies greatly in different localities. Prospective settlers in these regions are apt to give very little attention to climatic features other than the total rainfall. They often do not even assure themselves that the figures given for a region represent the normal rainfall and not simply the rainfall for a single year. They ignore almost completely the seasonal distribution of the rain, the frequency of torrential rains, the loss of water through surface run-off, the occurrence of hail, and the amount of evaporation. It is the object of this paper to bring the importance of these factors to the attention of prospective settlers in regions of limited rainfall.

Tables are also appended showing the normal rainfall for practically every station in these regions where precipitation records are available. Accurate information regarding the precipitation in many sections of the West is now available as the result of the extended observations of the United States Weather Bureau. These records, which are often complete for many years and so become of great value to the prospective settler, have been used in computing the rainfall tables which are given in the concluding pages of this bulletin. The precipitation tables are also supplemented by state maps which show at a glance the distribution of the rainfall in the State. Lines showing points of equal annual rainfall have been

drawn on these maps where sufficient observations were available. Maps of this kind have not before been available for these Western States.

CLASSIFICATION OF DRY-FARMING REGIONS.

Dry-farming regions are naturally classified on the basis of rainfall. In this country dry farming is usually considered to be confined to those regions in which the annual rainfall is less than 20 inches and more than 10 inches. This classification must be considered as only a rough approximation, since dry-farming districts can not be outlined on the basis of the annual rainfall alone on account of the great influence of the evaporation and the monthly distribution of the rain in growing dry-farm crops. Furthermore, it is impossible to say just where ordinary methods of farming leave off and dry-farming methods begin. Dry-farming methods are usually understood to mean those which lead to the conservation of moisture, but the conception of what these methods actually are varies greatly in different sections of the country. The dry farmer in the Great Plains, where the rainfall is from 15 to 20 inches, usually gets his best results with annual cropping methods combined with good tillage. On the other hand, the dry farmers in that part of the Great Basin where the rainfall is less than 15 inches follow the method of alternate cropping and summer tillage almost exclusively. Between these two classes there is a third operating under conditions where summer tillage may be necessary to insure returns on every crop, but where it frequently pays to take chances on producing a crop on the land each year.

The method of alternate cropping and summer tillage is generally recognized as the most highly developed dry-farming method because it gives better returns with a lower annual rainfall than other methods. There are considerable areas in central Utah that are cultivated in this way where the annual rainfall does not exceed 13 inches. It must be remembered, however, that this is a region of winter rainfall, and that the method of alternate cropping and summer tillage is particularly adapted for such regions, as we shall show later. Therefore, while the method of alternate cropping and summer fallowing is recognized as the most highly developed dry-farming method, it does not follow that it is the best method for all dry-farming regions or that it will always give the best returns. In dry-farming sections where the rainfall is not so limited as in Utah, and especially in regions having a summer rainfall, other methods give as good or better returns.

IMPORTANCE OF KNOWING THE NORMAL RAINFALL.

The rainfall in all parts of the United States is subject to wide fluctuations from year to year. The West does not appear to be more subject to these changes than the East, but the fluctuations

are felt more by the dry farmers because they are working upon a closer margin. Crops in the East are often lost through drought and not infrequently under conditions where the up-to-date dry farmer would have produced a good crop. On account, then, of the fluctuations in rainfall in any locality from year to year, it is necessary in judging the rainfall of a region to know the average annual rainfall, or, as it is called, the normal rainfall. This is the only safe basis upon which the rainfall of any region can be judged, and the longer the records the greater is the dependence that can be placed upon the normal. While two years' or three years' observations are safer than a single year's records, it is not uncommon for two or three wet years or for two or three dry years to follow one another in succession, so that the yearly rainfall obtained at such times would be too high or too low. Records for at least five years, and preferably for ten years, are necessary to obtain the normal rainfall of a region, and the longer the records the more reliable will be the result obtained.

MANY RAINFALL STATIONS NECESSARY ON ACCOUNT OF LOCAL VARIATIONS IN RAINFALL.

In studying the rainfall of a region too much dependence must not be placed upon the records of a single station, especially if this station is located in a mountainous region. Under such conditions marked differences in the annual rainfall are often found between stations located on the highlands and those in the valleys. The cooling of the moisture-laden air through expansion as it rises over a range of hills causes precipitation, so that the windward sides of mountains have a greater rainfall than the leeward sides. This is well illustrated in the very heavy rains which occur all along the west slope of the Cascade Range in Washington, Oregon, and northern California, while the rainfall on the east side is very much less. (See the rainfall maps for Washington, fig. 22, and Oregon, fig. 17; also the chart shown as fig. 1.) This is also well illustrated in Riverside and San Bernardino counties in southern California (see map, fig. 7), where a great change in rainfall occurs as we go eastward a few miles.

These sudden changes in normal rainfall are not, however, confined to the mountainous regions; marked instances of this kind occur in the Great Plains, where changes in elevation are comparatively slight. For example, the rainfall in the district around Aberdeen, in Brown County, S. Dak., is nearly 5 inches above that of the surrounding sections. (See the South Dakota rainfall map, fig. 18.) This difference is based upon observations extending over twenty years or more; and the effect upon the crops has been so marked that the farmers generally recognize that good crops may be found in this section when the surrounding regions are suffering from drought. It is important, then, to have as many rainfall stations as possible in order to measure accurately the annual precipitation.

THE DISTRIBUTION OF THE ANNUAL RAINFALL IN DRY-FARMING REGIONS.

The accompanying chart (fig. 1) shows the annual rainfall in the western United States, and has been prepared by the writers with particular reference to dry-farming regions.[a] The region repre-

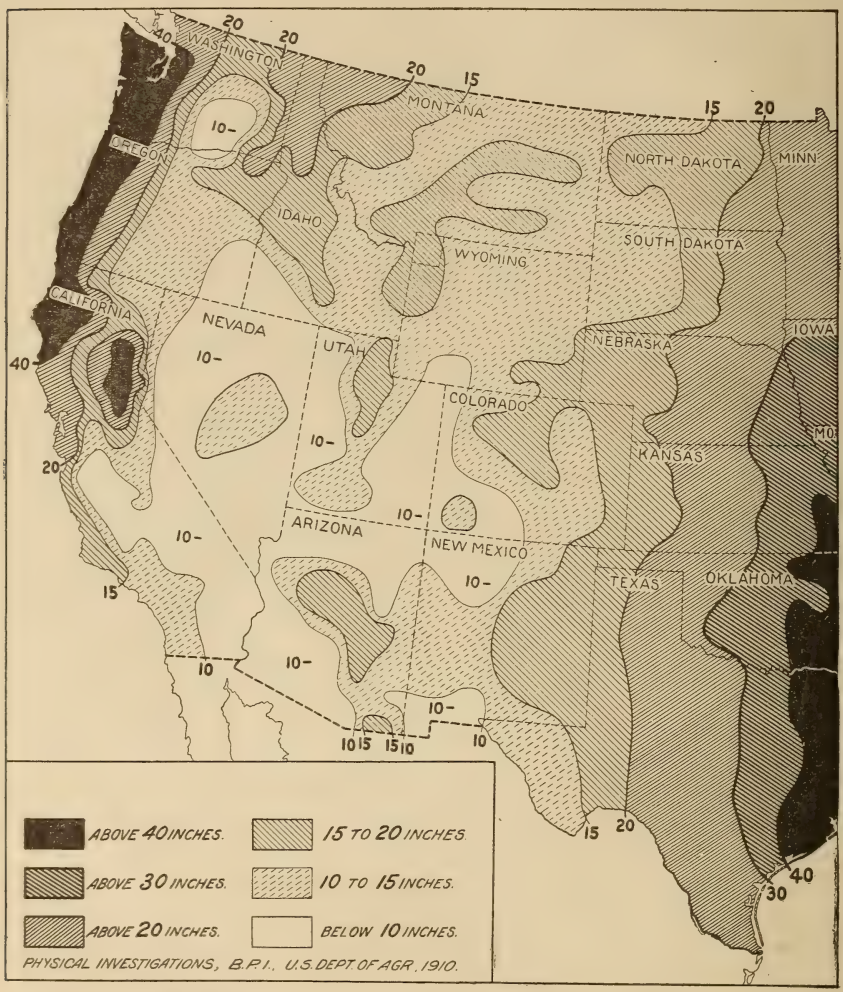

FIG. 1.—Chart showing the distribution of the annual rainfall in the dry-farming sections of the United States.

sented in the chart has been divided into zones, the boundaries of the zones being represented by lines along which the rainfall is uniform. For example, the heavy curved line marked 20, starting in the north-

[a] This chart is based upon the state rainfall maps (see pp. 33 to 45), which include the available rainfall records of the Weather Bureau to January, 1910.

eastern corner of North Dakota and passing southward through central South Dakota, central Nebraska, western Kansas, and the Panhandle of Texas, passes through points in these States where the normal annual rainfall is 20 inches. The average annual rainfall of the country lying to the east of this line is in general more than 20 inches and to the west of this line less than 20 inches. This line, representing points having a normal annual rainfall of 20 inches, is about 4° of longitude, or approximately 200 miles, farther west in Texas than in North Dakota.

The line representing an average annual rainfall of 15 inches extends west in North Dakota nearly to the western boundary, then bends eastward and passes through the center of South Dakota, then runs westward through the southwestern corner of Wyoming, and making a detour in the mountainous region of Colorado passes through the eastern part of that State and southward through the central portion of New Mexico. The country lying between this line of 15 inches annual rainfall and the line of 20 inches annual rainfall to the east has, then, an annual rainfall of 15 to 20 inches, the rainfall becoming greater as the 20-inch line is approached. A second region in which the annual rainfall is between 15 inches and 20 inches is shown in central Montana and northwestern Wyoming. A third region having this rainfall is to be found in northwestern Wyoming and central Idaho and northeastern Oregon. Similar areas exist in northern Utah, in the mountainous part of Arizona, and in northeastern California.

The line representing 10 inches of annual rainfall passes north and west through the central part of California and through extreme western Nevada, southeastern Oregon, and western Idaho, then bends sharply southward, making a great loop in the State of Utah, then runs through southwestern Wyoming, extreme western and southwestern Colorado, northwestern New Mexico, and northern and western Arizona. The unshaded area lying within this boundary has an annual rainfall of less than 10 inches. This area as a whole has not sufficient rainfall to make dry farming profitable, as it is carried on at the present time. The conditions are much more severe in the southern part of this area, owing to the higher evaporation. It is possible that grain may eventually be produced along the extreme northern border, particularly where other conditions are especially favorable.

In southern Washington a second region is to be found in which the annual rainfall is less than 10 inches. The evaporation in this region is much lower than in the sections just mentioned. It has been found possible to produce wheat successfully within the borders of this region on an annual rainfall of about 9 inches, using the method of alternate cropping and summer tillage.

Those areas which are included between the 10-inch and 20-inch lines of annual rainfall serve, then, to represent in a general way the dry-farming areas of the United States so far as they may be defined through rainfall. It must be constantly borne in mind, however, that conditions are more severe in the southern part of the region than in the northern part, owing to the high temperature and greater evaporation; so that regions having the same rainfall are by no means equally well adapted to the production of crops.

COMPARISON OF THE MONTHLY DISTRIBUTION OF RAINFALL IN THE GREAT PLAINS, INTERMOUNTAIN, AND PACIFIC COAST REGIONS.

The monthly distribution of the rainfall in the western United States can be divided roughly into three types—the summer rainfall

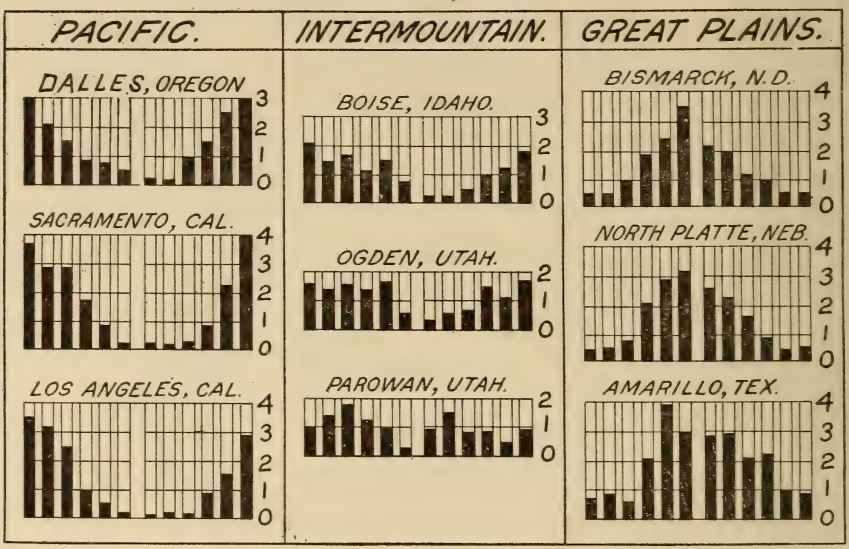

FIG. 2.—Chart showing the monthly distribution of the rainfall at representative stations in the Great Plains, Intermountain, and Pacific coast regions. The length of the black lines in each diagram represents the monthly precipitation at that place, beginning with January on the left. The scale in inches given on the right of each diagram can be used to find the actual amount of the monthly rainfall. For example, the average monthly rainfall at Bismarck, N. Dak., for June is seen to be 3½ inches, while for July it is only a little more than 2 inches. It will be noted that in the Pacific coast region the rain comes principally during the first and last months of the year, that is, in the winter, while in the Great Plains the rain comes principally during the middle of the year, that is, in the summer months.

of the Great Plains, the winter and spring rainfall of the Intermountain district, and the winter rainfall of the Pacific coast region. These three types are illustrated in figure 2, which shows the monthly rainfall for three stations in each of these regions. It will be noted that for Bismarck, N. Dak., North Platte, Nebr., and Amarillo, Tex., which are typical Great Plains stations, the rain occurs principally during the months of June, July, and August, and that the winter

months are very dry. In fact, about three-fourths of the total rainfall of the year at these stations occurs during the six summer months, from April to September, inclusive.

In the Pacific coast region, on the other hand, the rainfall occurs almost entirely during the winter months, and it will be seen from the chart that the summer months are very dry. The rainfall distribution in the Pacific coast region is, then, exactly opposite to that found in the Great Plains. In the Intermountain region the maximum precipitation occurs during the late winter and spring months. Thus there is here a distribution intermediate between that of the winter precipitation of the Pacific slope and the summer precipitation of the Great Plains.

The monthly distribution of the rainfall over the western portion of the United States is presented diagrammatically on the map shown as figure 1, which has been adapted from Bulletin N of the United States Weather Bureau. The change from a summer rainfall in the Great Plains to a winter rainfall on the Pacific coast is very marked, and the intermediate types are shown in the intervening country. In Arizona we find that the rainfall is divided into two periods during a year, a rainy season occurring during the winter months and a second rainy season in July and August, the latter being the greater.

THE RELATION OF MONTHLY DISTRIBUTION OF RAINFALL TO FARM PRACTICE.

In regions where the annual rainfall is low the monthly distribution of the rainfall determines to a large extent the farm practice of the region. A comparison of the systems of dry farming employed in the Great Basin and in the Great Plains will make this clear. In Utah and in a large part of the Great Basin country the precipitation comes largely in the winter and early spring. In consequence, spring wheat is not a successful crop in this region for two reasons: (1) The land can not be fitted for sowing until late in the season, owing to the spring rains, and (2) the driest part of the season occurs just when the spring-wheat crop would be maturing. On the other hand, the conditions in this region are almost ideal for growing winter wheat on summer-tilled land. The land is plowed in the fall so as to be left in the best condition for holding the snow and the winter and spring rains. It is then kept well tilled during the summer and contains sufficient moisture to start the crop in the fall. If a fall rain occurs about seeding time conditions are especially favorable. The fall-sown crop is then able to take advantage of the winter and spring precipitation and matures before the driest part of the season is reached. Clean summer fallowing (summer tillage) is considered absolutely necessary in this region in order to be sure of a successful

crop on account of the low rainfall in the autumn months and for the purpose of supplementing the low annual rainfall.[a]

In the Great Plains the monthly distribution of the rainfall is quite different from that of the Intermountain region, the greatest monthly rainfall occurring in June, July, and August. Summer tillage for moisture conservation is not so well adapted to this region. The frequent rains during the summer months repeatedly pack the surface mulch on the summer-tilled land. This requires frequent cultivation in order to avoid the loss of water by evaporation, and so increases the expense of maintaining the mulch. Owing to the high evaporation in the Great Plains during the summer months, very little water will be stored in the summer-fallowed land unless the mulch is carefully kept up by thorough cultivation after every rain. The higher annual precipitation in the Great Plains and the increased cost of maintaining a good mulch on summer-tilled land have thus combined to make summer fallowing in this region much less popular than in the Great Basin country. Furthermore, the blowing of the dry surface mulch of the summer fallow sometimes becomes very serious in the Great Plains owing to high winds.

For the above reasons annual cropping is largely used in preference to summer tillage in the Great Plains, although in some parts of the area summer-tillage methods are considered necessary to insure sufficient moisture, even at the cost of the increased labor necessary to maintain the surface mulch. Spring grains are generally used under the annual cropping method, since the crop escapes the dry fall and winter, and the land, having been recently worked, is in the best condition to absorb the summer rainfall. The shade of the growing crop partially protects the ground from excessive loss of water by evaporation, while the small summer showers that are useless on summer-tilled land always help the growing crop. Thus we have a radically different system of farm practice in the Great Plains from that found in the Intermountain country, owing in part to the difference in the distribution of the monthly rainfall of the two regions and in part to the greater rainfall in the Great Plains.

THE RELATION OF THE CHARACTER OF RAINFALL TO ITS USEFULNESS.

The way in which the rain comes has a great deal to do with its usefulness. Summer-fallowing methods, for example, are not well adapted to regions in which the rainfall comes largely in the form of little showers from one-tenth to one-half inch. Rains of this kind penetrate the soil only a few inches, and the water is practically all

[a] See "Arid Farming in Utah," by Widtsoe and Merrill, Bulletin 91, Utah Agricultural Experiment Station; also "Dry Farming in the Great Basin," by C. S. Scofield, Bulletin 103, Bureau of Plant Industry, U. S. Department of Agriculture.

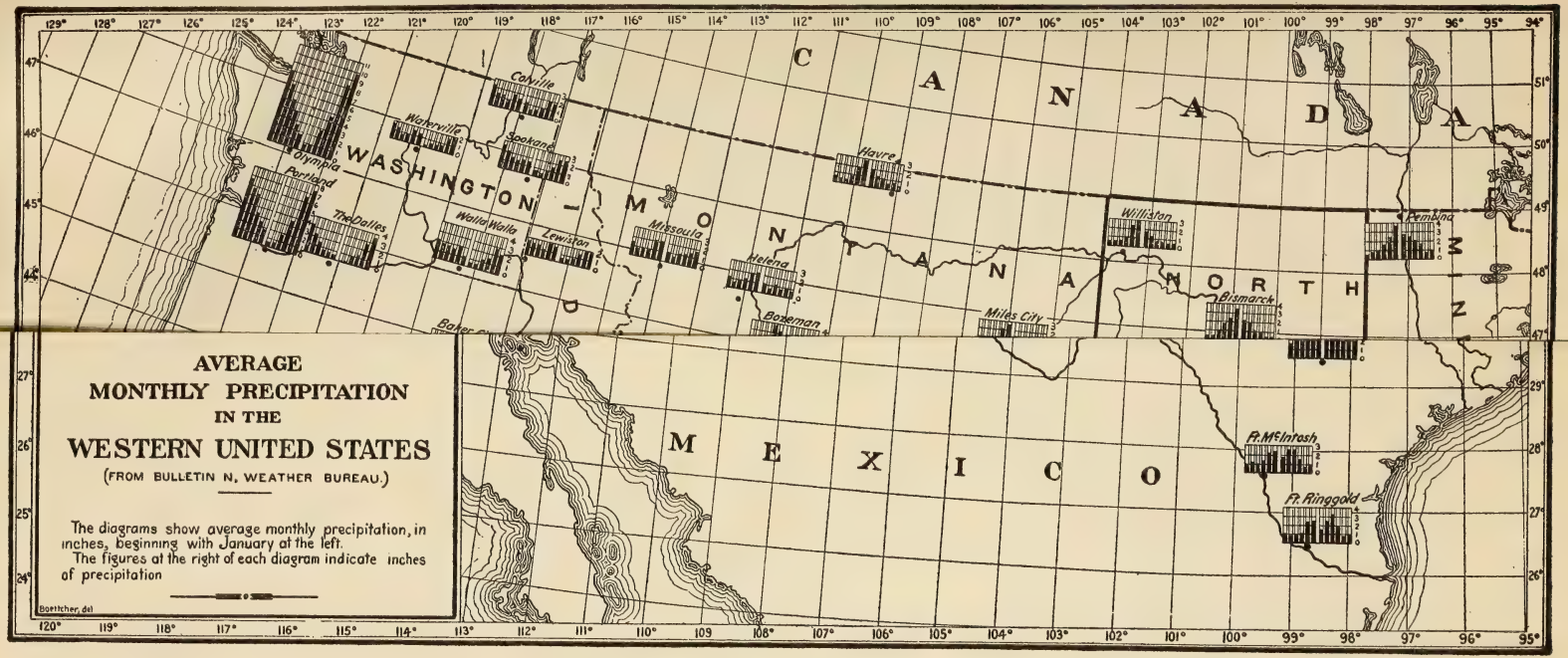

FIG. 3.—CHART SHOWING THE AVERAGE MONTHLY PRECIPITATION AT DIFFERENT POINTS IN THE WESTERN UNITED STATES. THE LENGTH OF THE BLACK LINES IN THE LITTLE DIAGRAMS ON THE MAP SHOWS THE MONTHLY PRECIPITATION, BEGINNING WITH JANUARY ON THE LEFT. A SCALE IN INCHES IS GIVEN ON THE RIGHT OF EACH LITTLE DIAGRAM.

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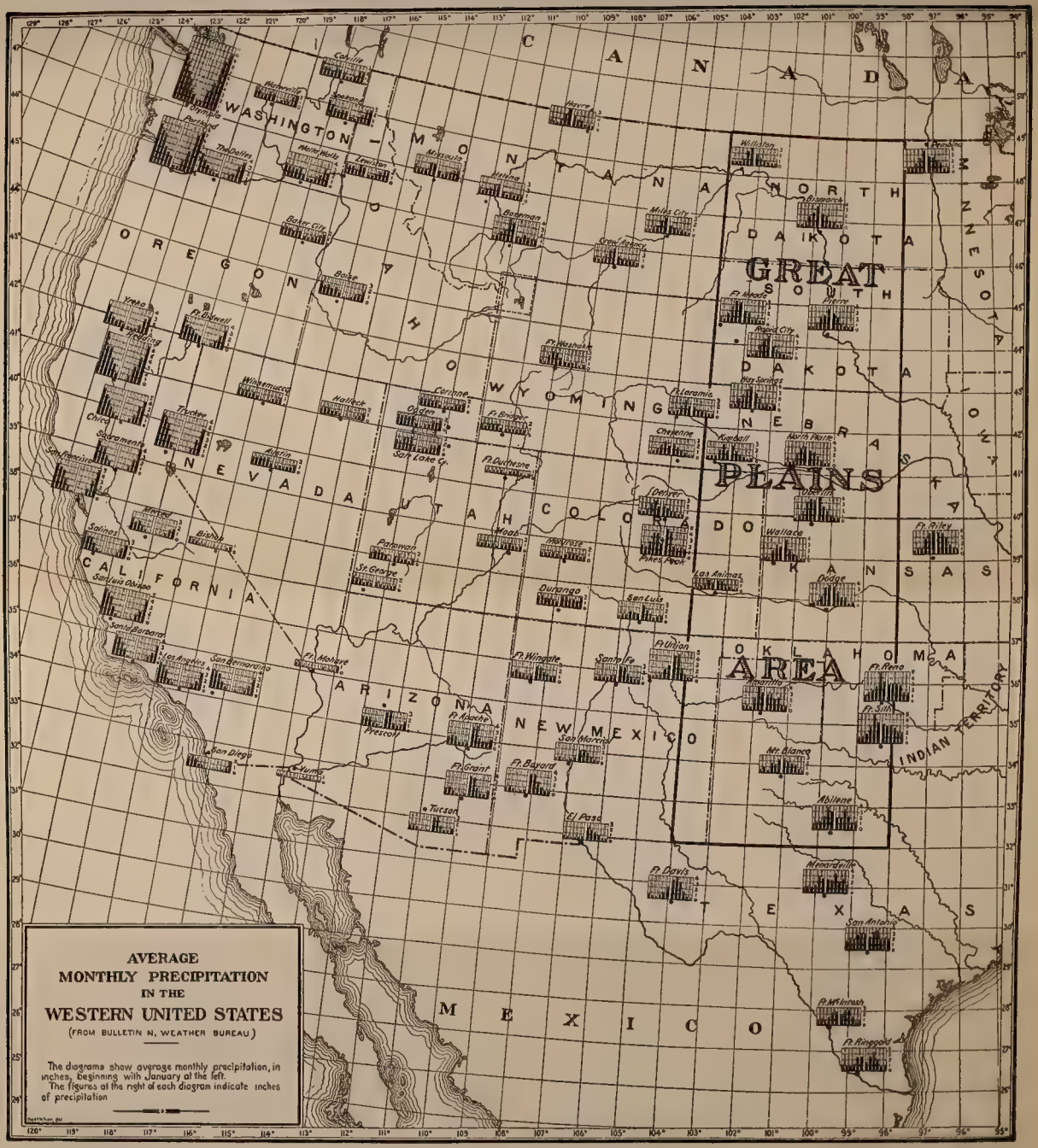

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lost through subsequent evaporation even when the surface of the soil is cultivated after the rain, since the rainfall does not penetrate below the depth of the mulch. These small rains are, however, usually sufficient to pack the mulch and form a surface crust, which must be broken by cultivation as soon as possible; otherwise, evaporation will go on so rapidly from the surface of the soil that far more moisture will be lost than was gained through the rain. At North Platte, Nebr., during the month of August, 1908, the total rainfall was 1.9 inches, which came in the form of nine showers. None of these rains was sufficient to wet thoroughly the mulch on the summer fallow and all were useless so far as storing water in the soil was concerned, and yet they necessitated a good deal of work in order to keep the mulch in good condition. Such rains are, of course, useful to growing crops that cover the ground, but for storing water in the soil showers of one-half inch or more are necessary.

RUN-OFF DURING TORRENTIAL RAINS.

If the rainfall is of a torrential character, the rain falling at the rate of an inch or more per hour, the loss through run-off becomes very serious. These torrential rains occur occasionally in all parts of the West. The records of the Weather Bureau show that they occur more frequently in the southern part of the region. It is important for the dry farmer to study the best methods of handling his land so as to absorb as much of these torrential rains as possible. Our recent fieldwork has shown that even on summer-fallowed land provided with a good mulch the loss through run-off during a torrential rain may be very great.

Measurements made by Mr. F. D. Farrell at the Nephi substation, Utah, in 1908, showed that during a heavy rain of 2.5 inches in four hours summer-tilled land absorbed only 0.5 inch of water, while near-by wheat stubble land, which was very dry and contained many surface cracks, absorbed 1.5 inches. In other words, the run-off on the summer-tilled land was 80 per cent of the total water falling, while the loss on the stubble was 40 per cent. The high loss on the summer-tilled land was probably due to the driving rain, which packed the fine surface soil so that it would not absorb the water freely. Similar measurements by one of the writers (Belz) at the experiment farm of the Office of Dry-Land Agriculture Investigations, at Dalhart, Tex., in 1909, showed that during a torrential rain of 2 inches the run-off from cultivated plats was from 20 to 60 per cent of the total rain falling. In another instance, with a rainfall of 1.1 inches, the average loss through run-off from seven cultivated plats amounted to 35 per cent of the total rainfall. All of these measurements were made on practically level land.

These results indicate that a fine surface mulch on summer-tilled land, while ideal in preventing evaporation, packs during a torrential rain and so fails to absorb the water freely. A rough, uneven, lumpy surface, including stubble, with finer soil beneath, is preferable under such conditions to a fine surface mulch. The rough surface material, combined with the finer soil below, still makes an effective mulch. During windy, dry weather, the rough, lumpy surface will protect the soil from blowing. During a torrential rain the rough surface will tend to prevent the soil from washing, and by holding the water to some extent will make the soil below absorb more. The treatment of the land so as to absorb all of the rain that falls is a matter of great importance to the dry farmer. This subject is now being given special attention at the experimental farms of the Office of Dry-Land Agriculture Investigations.[a]

HAIL.

Hail is one form of precipitation that is the dread of every dry farmer. Hailstorms are likely to occur in almost any portion of the Great Plains during the summer months and frequently do great damage to standing grain. These storms take place somewhat more frequently in the southern parts of the area, and in some districts seem to occur more often along the river courses and valleys than upon the table-lands. They do occur, however, on the table-lands and divides, and their path is generally narrow and very sharply defined, the hail sometimes completely destroying standing grain in part of a field and leaving the remainder uninjured. About the only precaution that the prospective settler can take is to try to avoid locating in regions which are known to be in the track of such storms. The grain should also be cut at the earliest possible date. Otherwise, the dry farmer must take his chances upon the occurrence of hail just as he must upon the occurrence of unusually dry weather. Many new settlers who feel that they can not afford to risk the loss of their crop insure against hail just as they insure against loss by fire. Established farmers as a rule find that it pays to carry their own insurance.

EVAPORATION IN DRY-FARMING SECTIONS.

The rate at which evaporation takes place in any given region has a marked influence upon the quantity of rainfall necessary for successful dry farming. The accompanying map (fig. 4) shows the evaporation taking place from a freely exposed water surface during the six summer months in different parts of the United States. The

[a] See article entitled "Dry-Land Farming in the Great Plains Area," by E. C. Chilcott, Yearbook of the U. S. Dept. of Agriculture, 1907.

figures on the chart represent the total evaporation in inches from April to September, inclusive.

The circles represent stations where dry-farming experiments are being conducted by the Bureau of Plant Industry. The figures for these stations can be compared directly, since they have all been obtained from tanks exposed in the same way. Most of these tanks are 8 feet in diameter and 2 feet deep, and are sunk in the ground so that the top of the tank is 4 inches above the surface of the ground. (See Pl. I, frontispiece.) The water level is kept about 4 inches from the top of the tank. The amount of water that has to be added to keep the water at this height, together with the rain that falls into the tank, gives the total evaporation for any required time.

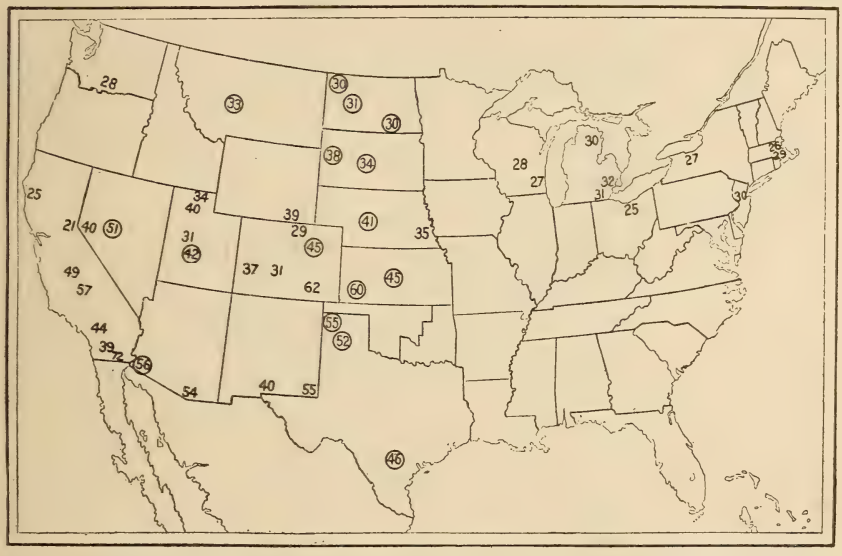

FIG. 4.—Chart showing the evaporation in inches during the six summer months from April to September, inclusive, for various points in the United States. The circles show stations where evaporation measurements are being made in connection with the field experiments of the Bureau of Plant Industry. The evaporation at these stations is measured in the same way and can be directly compared.

Three years' records have been obtained for some of these stations, and there is little change in the evaporation from year to year. These figures representing the evaporation for equal periods then become very useful in comparing the conditions in different sections of the country from a dry-farming standpoint.

Table I presents the results from which the accompanying map (fig. 4) was prepared and shows the total evaporation which took place from tanks during the six months from April to September, inclusive, for a number of points in the United States. The figures have been obtained from widely scattered sources, and the measurements were made with tanks of different sizes and exposed in different ways.

All of the results are not, therefore, directly comparable. The measurements at stations printed in heavy-faced type have been made as a part of the physical investigations carried on at the dry-farming stations of the Bureau of Plant Industry and can be directly compared.

TABLE I.—*Evaporation from a tank during the six summer months from April to September, inclusive, at various points in the United States.*

[The figures given represent the total number of inches evaporated during this period.]

State.	City or town.	Number of years.	Date.	Evaporation.
Arizona	Tucson	3	1892–3–4	[a] 54.2
	Yuma	3	1903 [b] 57.8	
			1904 [c] 53.9	56.0
			1907 **56.4**	
California	Calexico	1	1903–4	[d] 71.8
	Kingsburg Bridge	4	1882–3–4–5	[e] 49.2
	Lakeport	2	1901, 1902	[f] 25.3
	Lake Tahoe	2	1900 [g] 20.7	
			1901 [h] 21.6	21.1
	Pomona	1	1903–4	[d] 44.4
	Sweetwater	5	1889–90–91–92, 1897	[i] 39.0
	Tulare	1	1903–4	[d] 56.6
Colorado	**Akron**	2	1908 to 1909, inclusive	**45**
	Fort Collins	15	1887 to 1902	[j] 29.3
	Grand Valley	1	1901	[k] 36.5
	Rocky Ford	1	1901	[l] 61.6
Kansas	**Hays**	3	1907 to 1909, inclusive	**45.2**
	Garden City	2	1908 to 1909, inclusive	**59.9**
Massachusetts	Boston:			
	Beacon Hill			[m] 25.8
	Chestnut Hill			[n] 28.6
Michigan	Detroit	4	1861 to 1864, inclusive	[o] 32.1
	Monroe	5	1863 to 1867, inclusive	[o] 30.9
	Thunder Bay	4	1862 to 1865, inclusive	[o] 30.2
Montana	**Judith Basin**	1	1909	**32.6**
Nebraska	Lincoln	11	1899 to 1909, inclusive	[p] 34.8
	North Platte	3	1907 to 1909, inclusive	**41.3**
Nevada	**Fallon**	2	1908 to 1909, inclusive	**51.0**
	Reno	2	1894 [q] 37.5	
			1900 [r] 42.3	39.9
New Jersey	New Brunswick	2	1900–1901 [s] 29.1	
			1901–2 [t] 29.9	29.5
New Mexico	Carlsbad	1	1899	[u] 54.6
	Las Cruces	3	1899, 1900, 1901	[v] 40.1
New York	Rochester	5		[w] 26.7
North Dakota	**Dickinson**	3	1907 to 1909, inclusive	**31.4**
	Edgeley	3	1907 to 1909, inclusive	**29.8**
	Williston	1	1909	**30.0**

[a] Arizona Agricultural Experiment Station Bulletin 27.
[b] Engineering News, vol. 51, p. 248.
[c] Water-Supply Papers, No. 133, p. 32.
[d] Engineering Record, vol. 51, p. 430.
[e] Water-Supply Papers, No. 81, p. 27.
[f] Idem, p. 32.
[g] Idem, p. 21.
[h] First Annual Report Reclamation Service, 1902, p. 230. Estimated from 5 months' record.
[i] Colorado Agricultural Experiment Station Bulletin 45, p. 26.
[j] Fifteenth Annual Report Colorado Agricultural Experiment Station, p. 205.
[k] Report Irrigation Investigations, Office of Experiment Stations, 1901, p. 284.
[l] Idem, p. 31.
[m] Transactions American Society of Civil Engineers, vol. 15, p. 606 (1888 omitted, the records for that year not being complete).
[n] Idem, p. 618.
[o] Report Chief of Engineers, U. S. Army, 1868, p. 978 (May 4 to October 5).
[p] Nebraska Agricultural Experiment Station. Data furnished by Prof. E. G. Montgomery.
[q] Water-Supply Papers, No. 81, p. 22 (May 11 to October 30).
[r] Report Irrigation Investigations, Office of Experiment Stations, 1900, p. 151 (May 4 to October 24).
[s] Report Irrigation Investigations, Office of Experiment Stations, 1901, p. 353 (April 4 to November 30).
[t] Report Irrigation Investigations, Office of Experiment Stations, 1902, p. 247.
[u] Idem, p. 31 (May 1 to November 11).
[v] New Mexico Agricultural Experiment Station Bulletin 59, p. 43.
[w] Colorado Agricultural Experiment Station Bulletin 45, p. 27.

TABLE I.—*Evaporation from a tank during the six summer months from April to September, inclusive, at various points in the United States*—Continued.

State.	City or town.	Number of years	Date.	Evaporation.
Ohio	Cleveland	6	1862 to 1867, inclusive	[a] 24.6
South Dakota	**Bellefourche**	2	1908 to 1909, inclusive	**38.0**
	Highmore	1	1907	**33.7**
Texas	**Amarillo**	3	1907 to 1909, inclusive	**52.4**
	Dalhart	2	1908 to 1909, inclusive	**54.6**
	San Antonio	3	1907 to 1909, inclusive	**45.7**
Utah	Corinne	1	1901	[b] 40.1
	Fort Douglas	3	1890-1-2	[c] 30.7
	Logan	1	1901	[d] 34.3
	Nephi	2	1908 to 1909, inclusive	**42.0**
Washington	Prosser	2	1900 24.6 1901 30.6	[b] 27.6
Wisconsin	Milwaukee	5	1863 to 1867	[e] 26.9
	Stevens Point	2	1901 [f] 28.2 1902 [g] 29.4	28.8
Wyoming	Laramie	7	1893–1898, 1901	[h] 39.4

[a] Report Chief of Engineers, U. S. Army, 1868, p. 978.
[b] Report Irrigation Investigations, Office of Experiment Stations, 1901, p. 31 (May 18 to November 9). (The records for Prosser are for 1900, May 9 to October 29, and 1901, April 22 to October 28.)
[c] Water-Supply Papers, No. 7, p. 20.
[d] Utah Agricultural College Bulletin 80, 1901, p. 77.
[e] Report Chief of Engineers, U. S. Army, 1868, p. 978.
[f] Report Irrigation Investigations, Office of Experiment Stations, 1901, p. 335 (estimated from 3 months' records).
[g] Report Irrigation Investigations, Office of Experiment Stations, 1902, p. 232 (estimated from 4 months' records).
[h] For records 1893 to 1898, inclusive, see Water-Supply Papers, No. 81, p. 21.

1893.....37.1 inches (estimated from records April 24 to September 30).
1894.....38.5 inches (estimated from records April 26 to September 30).
1895.....37.1 inches (estimated from records April 17 to September 30).
1896.....40.5 inches (estimated from records June 1 to September 30).
1897.....42.0 inches (estimated from records April 24 to September 30).
1898.....42.3 inches (estimated from records April 15 to September 30).

For records of 1901, see Wyoming Agricultural Experiment Station Bulletin 52, p. 50.

1901.....38.2 (estimated from records May 9 to September 30).

The rate of evaporation from a wet soil surface is about the same as from a freely exposed water surface in a tank.[a] Consequently, if the surface of the soil were kept constantly wet the evaporation from the soil would be approximately equal to that found by means of the tank. The fact that we find the evaporation as measured by the tank to be so much greater than the rainfall shows how efficient our methods of cultivation must be in order that we may have any water at all left for the use of the crop. In a region having an evaporation during the six summer months of 45 inches and a rainfall of 18 inches, most of which occurs during the summer, we are able through cultivation to cut the evaporation from the soil down to approximately

[a] This statement must, of course, be considered as only approximate. Very wet, dark-colored soils freely exposed in the sun will usually lose water by evaporation more rapidly than a free water surface, since the dark soil surface absorbs a larger proportion of the energy from the sun than the free water surface does. The evaporation from light-colored soils when wet agrees more closely with that taking place from a free water surface of equal area. As the soils dry out the rate of evaporation gradually decreases. This shows the advantage in using a clean, freely exposed water surface in measuring evaporation, which avoids the errors arising from changes in the nature of the evaporating surface.

half the rainfall and so save the remainder of the rainfall for the use of the crop. In establishing a mulch it is necessary to sacrifice all of the moisture in the surface layer of soil that is used to form the mulch. Any rain, then, that simply wets the surface mulch is of no value in storing moisture in summer-tilled land, since it must all be evaporated in order to establish the mulch again.

EVAPORATION AS INFLUENCING AGRICULTURE IN THE GREAT PLAINS.

The increase in evaporation is very marked as we proceed southward through the Great Plains, the seasonal evaporation in the Panhandle of Texas being 54 inches, or about double that in North Dakota. The influence of this increased evaporation upon the agricultural operations is seen by comparing the agricultural operations along the line of 20-inch annual rainfall in the two States. This line in North Dakota passes through the head of the Red River valley, where the rainfall has been ample for the successful growing of wheat upon the same land year after year. In Texas the 20-inch line passes through a country which is still largely grazing land and where agriculture is confined to the most drought-resistant crops, such as kafir and milo. It is evident, then, that in dry-farming sections having equal rainfall the North has a decided advantage over the South-owing to the lower evaporation.

Dr. H. L. Shantz, of the Bureau of Plant Industry, finds that the distribution of a native grass is a good index of the rainfall required in different sections of the Great Plains. Short grass, which consists chiefly of buffalo grass and grama grass, is well suited for this purpose, since it occurs from Montana to Texas. In each section the grass grows as far west as the opposing influences of rainfall and evaporation will permit. Its growth to the east is checked by competition with the prairie grasses. Thus we have a strip of short grass extending from Montana to Texas, limited on the west side by drought and on the east by competition with other grasses. Therefore the increase in the annual rainfall as we go from north to south in the short-grass region represents the additional amount of rain needed to offset the increased evaporation. In Montana, short grass unmixed with other grasses occurs in districts having an annual rainfall of approximately 14 inches; in Colorado, in regions having a rainfall of 17 inches; and in the Panhandle of Texas, in regions having an annual rainfall of 21 inches.[a]

The same type of native grass requires in Texas 7 inches more of rain a year than in Montana. This gives us at once a measure of

[a] The authors are indebted to Doctor Shantz for this preliminary account of his investigations on the distribution of the vegetation of the Great Plains, which will shortly appear as a bulletin of the Bureau of Plant Industry.

the additional amount of rain required for a grain crop in Texas as compared with Montana. Furthermore, the evaporation in Texas during the six summer months exceeds that in Montana by about 20 inches. Therefore, if the summer evaporation at one place in the Great Plains exceeds that at another by 3 inches a corresponding increase in the summer rainfall of approximately 1 inch at the first place is needed to offset the increased evaporation. A rainfall of 21 inches in the Panhandle of Texas is therefore really no better for growing crops than 15 inches in Montana or Dakota, owing to the greatly increased evaporation on the Texas plains.

The influence of the amount of evaporation in different sections of the Great Plains upon the effectiveness of the rainfall in crop production is illustrated in the accompanying chart (fig. 5). The heavy curved line marked "20" passes through points in the Great Plains States having an annual average rainfall of 20 inches. From what has already been said, it is evident that the conditions determining crop production become more and more severe as we pass southward along this line, owing to the increase in the evaporation. It would therefore be necessary to move more and more to the eastward from the line representing an annual rainfall of 20 inches as we go southward through the Great Plains, in order to find conditions that are equally favorable for crop production so far as rainfall is concerned. The broken line which is coincident with the line of 20 inches annual rainfall in the northern part of North Dakota and which becomes more and more separated from it as we move southward through the Great Plains passes through points having a rainfall equivalent to 20 inches in North Dakota. The actual rainfall along this line increases as we go south through the area until the lowlands of Texas are reached, but owing to the increased evaporation it is no more effective in growing crops than is 20 inches in North Dakota or Montana.

To the west of the line of 20 inches annual rainfall will be found a second line which passes through points having an average annual rainfall of 15 inches. In connection with this line of 15 inches annual rainfall there is given on the map a second broken line which passes through points having a rainfall equivalent to 15 inches in North Dakota or Montana. It will be noted that through southwestern Nebraska and northwestern Kansas this broken line is practically coincident with the line of 20 inches annual rainfall. In other words, 15 inches of rainfall in Montana or Dakota are equivalent to 20 inches of rainfall in southwestern Nebraska or western Kansas. In southwestern Kansas, eastern Oklahoma, and in Texas this line lies wholly to the east of the line representing 20 inches annual rainfall. Throughout this latter section, then, more than 20 inches of rainfall

would be required in order to be equivalent to 15 inches of rainfall along the Canadian boundary. These lines of equivalent rainfall have been established from a consideration of the distribution of the short grass through the Great Plains and from a study of the evapo-

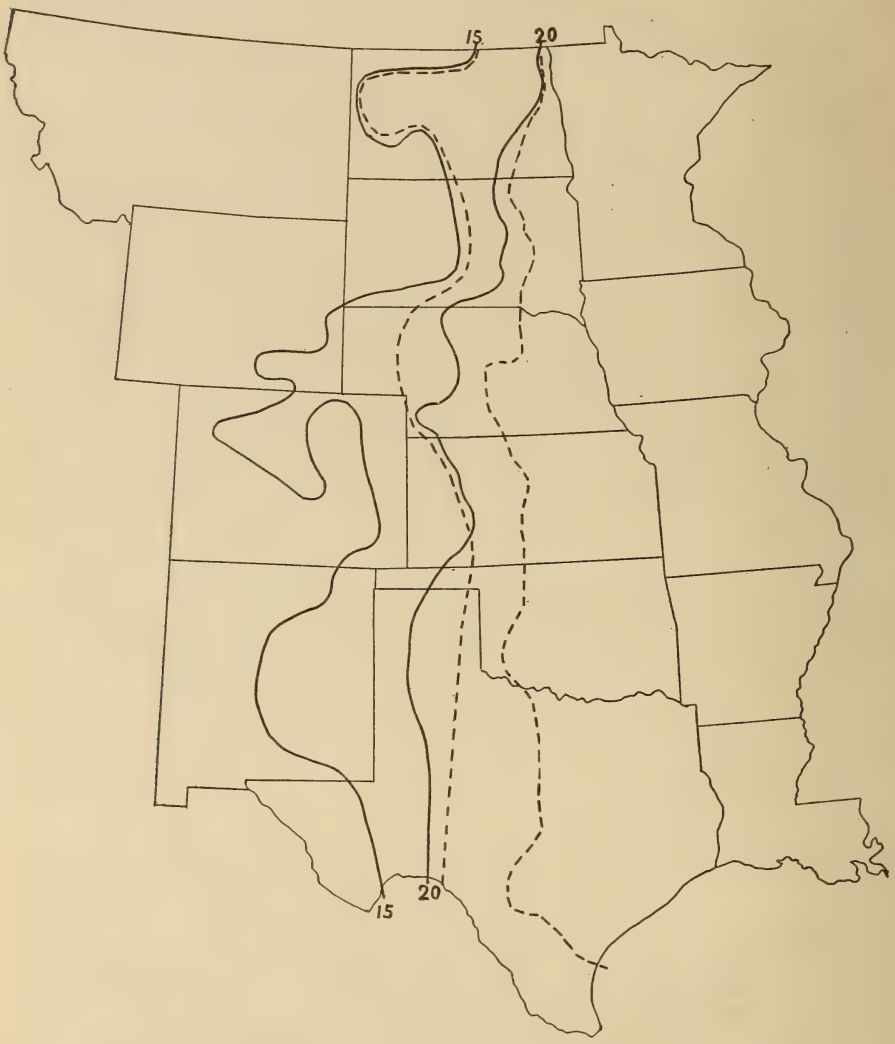

FIG. 5.—Outline map of the States in the Great Plains region, showing the lines of equal rainfall and lines of equivalent rainfall. The solid lines marked 15 and 20 pass through points of equal rainfall; the corresponding dotted lines pass through points having a rainfall which is equivalent to 15 and 20 inches, respectively, on the Canadian boundary.

ration. Their position should be considered as only approximate, but they serve to emphasize the great influence of the increased evaporation upon the amount of water required for crop production.

RELATION OF YIELD TO RAINFALL.

In order that the prospective settler may form an idea of the yields that he can reasonably expect to obtain in regions of limited rainfall, there is given in the following pages a summary of the yields obtained at a number of experimental farms conducted under state and federal supervision.

RELATION OF YIELD TO RAINFALL IN THE GREAT BASIN.

During the years 1904, 1905, and 1906 the Utah Agricultural Experiment Station conducted experiments at six dry-farming stations in Utah.[a] The following table shows the average yield of wheat obtained by summer-fallowing methods at these stations during the three years. The table shows the yearly precipitation, the precipitation that occurred during the growing season from April 1 to July 20, and the corresponding yield.[b] The location of the counties may be seen by referring to the Utah precipitation map, page 44.

TABLE II.—*Relation of precipitation to yield of Lofthouse wheat on summer-fallowed lands at six dry-farming stations in Utah.*

[From Bulletin No. 100, Utah Agricultural Experiment Station.]

County and year.	Yearly precipitation, August 1 to July 31.	Seasonal precipitation, April 1 to July 20.	Yield of wheat per acre.
	Inches.	*Inches.*	*Bushels.*
Iron:			
1904	13.4	3.8	6
1905	9.9	2.8	0
1906	15.9	3.2	7
Juab:			
1904	15.4	3.9	20
1905	11.3	3.1	15
1906	18.4	6.3	31
Tooele:			
1904	18.5	4.6	13
1905	12.4	3.2	11
1906	13.0	4.5	16
Sevier:			
1904	13.2	6.0	8
1905	11.5	4.1	5
1906	15.5	4.6	8
Washington:			
1904	13.4	2.2	2
1905	10.9	2.9	4
1906	16.6	4.1	9
San Juan:			
1904	6.6	2.8	0
1905	19.0	5.3	21
1906	20.0	4.8	29

[a] Bulletin 100, Utah Agricultural Experiment Station, by W. M. Jardine.

[b] The writers are indebted to Mr. W. M. Jardine for assistance in compiling the yields given in this table. The figures are based upon the average yields of Lofthouse wheat plats and represent in most cases the average of the Lofthouse wheat yields in the variety tests, in the depth-of-plowing tests, and in the time-of-seeding tests, 3 to 5 plats in all. In the depth-of-plowing tests the yield of the plat plowed 8 inches deep was taken when possible, and in the other cases the average of the yields from the plats plowed 5 inches deep and 10 inches deep was used. In the time-of-seeding tests the yields of the plats sown on dates recommended in the bulletin were used. These figures, therefore, represent the yields of wheat grown under conditions generally advocated in the region, viz, on land plowed 8 inches deep and summer-fallowed.

The cost of producing an acre of wheat on summer-fallowed land in Utah, including seed and harvesting, is about $7,[a] which with wheat at 75 cents would be equivalent to about 9 bushels of wheat per acre. On this basis wheat production proved profitable during the three years in Juab and Tooele counties. In San Juan County in 1904 the rainfall was less than 7 inches and the crop was a failure. During the next two years, however, the rainfall was about 20 inches and good yields were obtained. The yields at the other three stations during the three years do not cover the cost of growing the crop. The records of Juab County show clearly the influence of the amount of rain on the yield, the yields varying from 15 bushels with a rainfall of 11 inches in 1905 to 31 bushels with a rainfall of 18 inches in 1906. Jardine emphasizes the importance of having at least 4 inches of rain during the growing season from April 1 to July 20.

To summarize, in Tooele and Juab counties, Utah, profitable yields were obtained when the rainfall exceeded 13 inches. At the other stations in Iron, Sevier, and Washington counties a rainfall of 15 inches was not sufficient to produce profitable crops. The evaporation from a freely exposed tank of water has been found to be about 42 inches during the six summer months in Juab County. We may conclude, then, that with this amount of evaporation an annual rainfall of 13 inches represents about the minimum under which farming can be profitably carried on in the Great Basin.[b]

MINIMUM RAINFALL NECESSARY FOR WHEAT PRODUCTION IN THE COLUMBIA BASIN.

There is probably no other region in the United States where dry farming is successfully conducted with so low a rainfall as in the Columbia Basin, in southern Washington and northern Oregon. This is the result of a combination of favorable conditions. The evaporation is considerably lower than in the Great Basin, the rains come mainly during the winter season and are not torrential, and the basaltic soils absorb the rainfall readily. As we have already seen, the system of alternate cropping and summer fallow is especially

[a] Grace Brothers, who operate a large farm in Juab County, Utah, find the average cost of growing wheat on summer-fallowed land to be $6.85 per acre. This figure includes all charges except an interest charge for the land. (See Second Annual Report Dry-Farming Congress, p. 170.)

The cost of growing spring wheat on fall-plowed land in Minnesota, as given by E. C. Parker and T. P. Cooper, ranges from $4.30 (on a large farm) to $6.40 per acre. These figures do not include land rental or the cost of hauling the grain to market.

Other things being equal, it is to be expected that wheat production under the system of alternate cropping and summer fallowing would be somewhat more expensive than under the annual cropping system, as in Minnesota, owing to the increased cost of maintaining the summer fallow.

[b] Prof. L. A. Merrill, of the Utah station, places the minimum annual rainfall for profitable dry farming in that section at 12 inches.

adapted to such conditions and is the method uniformly followed in that part of the Columbia Basin where the rainfall is light. Summer tillage of the fallow land is also carried on quite generally throughout the region.[a] The rainfall records in the drier portions of the Columbia Basin are very broken, so that it is not possible at the present time to determine the relation of yield to rainfall with exactness. Hunter,[b] who has made a special study of the conditions in this region, states that while wheat is being produced on an average annual rainfall as low as 8.5 inches, 10 inches is about the minimum for successful wheat production. A great deal of wheat is grown around Ella, in Morrow County, Oregon, and in other parts of the northern tier of counties in Oregon where the rainfall is no greater than that of Ella. The average annual precipitation at Ella, Oreg., during the last ten years has been 9.5 inches. During this period the rainfall has varied from 12.8 inches in 1906 to 5.2 in 1908. During a year of heavy rainfall the yield of the wheat crop grown on summer-fallowed land at Ella is from 20 to 30 bushels per acre, or even more. When the rainfall is 6 or 7 inches the crop is sometimes not worth cutting and the yields are frequently only 6 or 7 bushels per acre. No wheat is grown in the driest part of the basin in the vicinity of Pasco, Wash., where the annual rainfall is only about 6 inches.

It appears to be established, then, that wheat is being grown at a profit in this region by summer-fallowing methods on an annual rainfall of 10 inches. The minimum rainfall necessary for a wheat crop that will return more than the cost of production appears to be about 8.5 inches, although actual yields in connection with rainfall records are not yet available to establish this minimum definitely. The yields on the same rainfall of course vary considerably according to the methods and care employed in the production of the crop.

RELATION OF YIELD TO RAINFALL IN THE GREAT PLAINS.

The Office of Dry-Land Agriculture Investigations of the Bureau of Plant Industry has been conducting extensive investigations since 1906 to determine the cultural methods and systems of crop rotation best adapted to the conditions in the Great Plains. The following table has been compiled from the results of these experiments, which are now available to the end of the season of 1909.[c] The results of the

[a] For a description of the methods of tillage used in this section, see the paper by Byron Hunter, entitled "Farm Practice in the Columbia Basin Uplands," Farmers' Bulletin 294, U. S. Dept. of Agriculture, 1907.

[b] The writers desire to acknowledge their indebtedness to Mr. Byron Hunter, of the Office of Farm Management of the Bureau of Plant Industry, for the information relative to wheat yields in the Columbia Basin.

[c] See "A Study of Cultivation Methods and Crop Rotations for the Great Plains Area," by E. C. Chilcott and members of the field staff of Dry-Land Agriculture Investigations, Bulletin 187, Bureau of Plant Industry, U. S. Dept. of Agriculture, 1910.

work cover experiments at eleven stations, extending from Montana to the Panhandle of Texas.

TABLE III.—*Variation in yield of spring-sown wheat with rainfall in the Great Plains.*

[Based upon the field experiments of the Office of Dry-Land Agriculture Investigations.]

Station and year.	Ordinary methods.	Conservation methods.	Summer tillage.	Rotations, average of 7 plats.	Average yield of 10 plats.	Rainfall, April–July, inclusive.	Rainfall for the year.	Rainfall for the year.		Rainfall for the season.	
								Above normal.	Below normal.	Above normal.	Below normal.
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Judith Basin, Mont., 1909	33.0	33.4	34.0	34.6	34.3	14.0	25.6	10.4	.....	1.4	.....
Dickinson, N. Dak.:											
1908	24.3	17.7	33.8	28.1	27.3	10.5	19.5	4.5	.....	2.3	.....
1909	26.8	25.2	35.7	36.4	34.3	11.2	20.9	5.9	.....	3.0	.....
Edgeley, N. Dak.:											
1907	4.1	7.0	9.9	11.1	9.9	6.7	11.5	.....	8.0	.....	4.8
1908	13.3	15.3	16.0	17.1	16.4	9.2	17.1	.....	2.5	.....	2.3
1909	28.3	23.3	27.0	29.7	28.7	10.8	15.6	.....	4.1	.....	.7
Highmore, S. Dak.:											
1907	28.8	29.7	30.0	28.2	28.6	11.1	17.3	.....	.1	.1	.....
1908	26.3	19.7	30.7	25.3	25.4	12.5	22.4	5.0	.....	2.1	.....
Bellefourche, S. Dak., 1909	23.8	23.3	32.2	29.1	28.3	7.9	(a)	.....	.....	.....	.....
North Platte, Nebr.:											
1907	24.5	26.0	31.8	23.7	24.8	12.3	19.1	1.0	.....	1.2	.....
1908	22.7	27.3	40.5	28.9	29.3	12.8	20.0	1.1	.....	1.7	.....
1909	23.0	15.3	18.0	20.1	19.7	13.7	18.9	.....	.....	2.6	.....
Akron, Colo., 1909	14.3	10.3	18.5	17.0	16.2	10.2	22.4	3.3	.....	.....	.....
Hays, Kans., 1908	1.2	4.5	4.2	3.8	3.7	14.2	25.3	1.9	.....	1.8	.....
Garden City, Kans., 1909	2.1	3.2	6.7	3.0	3.3	11.3	22.0	3.3	.....	0.1	.....
Dalhart, Tex., 1909	.0	.0	10.5	1.1	1.8	8.3	16.0	.....	.....	.....	.....
Amarillo, Tex.:											
1908	17.0	14.0	16.0	10.5	12.1	12.6	19.1	.....	3.5	1.3	.....
1909	.0	2.8	10.5	1.4	2.3	8.5	18.4	.....	4.1	.....	2.9

(a) Year not complete.

The first column of the table shows the station and State in which the field work was conducted and the year in which the experiments were carried on; the second column gives the yield of spring wheat in bushels per acre under ordinary methods of cultivation—that is, shallow spring plowing and no harrowing of the grain after planting; the third column, headed "Conservation methods," gives the yields of spring wheat on land plowed 8 inches deep in the fall, put in good tilth in the spring before planting, and harrowed after the grain was up in order to conserve moisture; the fourth column, headed "Summer tillage," gives the yield of spring wheat grown on land summer tilled the preceding year; the fifth column, headed "Rotations," gives the average yield of wheat in seven different rotations carried on at each of the stations; all of the methods employed and the yields obtained are described in detail in the bulletin referred to. In the sixth column is given the average yield of wheat from the ten plats previously considered, namely, the seven rotation plats and three

tillage plats; in the seventh column is given the rainfall from April to July, inclusive, in inches. This period is selected as coinciding most nearly with the average growing season at the different stations. The eighth column gives the total rainfall for the year, while the last four columns show the amount that the total rainfall for the year and the season was above or below the normal for that station.

Referring to the last columns of the table, it will be seen that for the 18 series of experiments reported the rainfall for the year in 9 instances was above the normal and in 6 instances below the normal. While the yields in the greater number of cases have been obtained during wet years, very trying conditions were encountered at some of the stations. At Judith Basin, Mont., and at Dickinson, in the western part of North Dakota, the rainfall has been unusually high, ranging from 5 to 10 inches above the normal. The effect of this is well exemplified in the yields at Judith Basin, ordinary methods of cultivation giving as good yields with a bountiful rainfall as either conservation or summer-tillage methods. At Dickinson somewhat higher yields were obtained with summer tillage, but not enough to justify this method if the bountiful rains could have been foreseen.

At Edgeley, in the southeastern part of North Dakota, three dry seasons were encountered. In the first less than 7 inches of rain fell during the growing season. The yield on spring-plowed land was 4 bushels per acre; on summer-fallowed land, 10 bushels. In 1908, with a rain of 9 inches during the growing season, the yields were 13 and 16 bushels, respectively; and in 1909, with 11 inches of rain during the growing season, the yields were 28 and 27 bushels per acre. The effect of a slightly increased rainfall during the growing season upon the yield is very marked at this station. In 1907, with a seasonal rainfall of 7 inches, the average yield was about 10 bushels per acre; in 1909, with a seasonal rainfall of 11 inches, the yield was about 29 bushels per acre, or a gain in yield of 19 bushels for an increase in rainfall of 4 inches.

The results at Edgeley show an increased production on summer-tilled land during 1907, which was very dry. It is important to note, however, that the average yield from the rotation plats was even higher than from the summer-tilled land at this station during this dry year. In fact, the rotations gave better yields than summer-tillage methods for each of the three years during which experiments have been conducted at this station. This indicates that summer tillage is not profitable on the soils of the Edgeley district even during years of deficient rainfall.

An average yield of about 28 bushels was obtained at the Highmore station in South Dakota during the season of 1907 under a normal rainfall. In 1908 an average yield of 25 bushels per acre was

obtained at this station. The rainfall during this year was 5 inches above the normal, but it will be seen from the table that the rainfall during the growing season was only 1.4 inches above that in 1907. The lower yield at Highmore in 1908 is probably to be explained by the fact that the last three weeks of July and the first week of August were very dry, less than 1 inch of rain falling during this time. These results show the necessity of knowing the seasonal rainfall when studying the relation of yield to rainfall in the Great Plains. Frequently, as in this case, a knowledge of the monthly rainfall is not even sufficient, but the daily distribution must be known to determine the influence of the precipitation upon the yield.

At Bellefourche, in western South Dakota, in 1907, a yield of 24 bushels was obtained on spring-plowed land as compared with 32 bushels on summer-tilled land and 29 bushels as the average yield on the rotation plats. These yields were obtained with a rainfall of about 8 inches during the growing season. It will be noted that while summer tillage gave the highest yields, the yield from the rotation plats was nearly as high. Therefore, on the heavy gumbo soils represented by the Bellefourche district, with a seasonal rainfall of 9 inches, the results indicate that crop rotations will give much better returns than summer tillage, considering the fact that a crop on summer-tilled land is obtained only once in two years.

At North Platte, Nebr., the seasonal precipitation has been very uniform for the three years during which experiments have been conducted, varying from 12 to 14 inches. The yield of wheat during these three years, based upon an average of 10 plats, varied from 20 to 29 bushels. We will consider briefly the cause of this fluctuation in yield.

The soil at North Platte is a silt loam of loess formation and absorbs water readily. The season of 1906 was very wet, so that the season of 1907 opened with a good supply of moisture in the soil. Consequently, good yields were obtained in 1907, although the influence of a rather dry spring is shown in the lower yields of the spring-plowed plat.

The fall of 1907 and the spring of 1908 at North Platte were very dry, only 3.5 inches of precipitation occurring from October 1 to May 1. In May, June, and July there was abundant rain. It is under such conditions that moisture-conservation methods become most effective. The moisture stored in the soil by conservation methods is sufficient to carry the crop through a dry spring, and when supplemented by abundant summer rains is sufficient for the production of large crops. Thus, during 1908 a yield of 40.5 bushels was obtained from summer-tilled land as compared with 22.7 bushels from wheat sown on spring-plowed land.

In 1909, on the other hand, the highest yield of wheat at North Platte was obtained from spring-plowed land. The seasonal rainfall was the highest of any of the three years. But the rainfall was not the factor which controlled the yields during this season. There was abundant moisture for all the crops. In this case the temperature was the controlling factor. The wheat sown on the conservation plats encountered freezing weather for five days just as it was coming up. In the spring-plowed plats, where conditions were not so favorable, the germination was retarded and the plants were not injured during this cold weather. More freezing weather occurred a week later, which injured the more advanced grain to such an extent that it never recovered, and the wheat sown on spring-plowed land consequently gave better yields.

The stations so far considered are located in the central and northern part of the Great Plains, where the conditions are not so severe owing to the lower evaporation. The remaining stations are located in a section subject to high winds, hail, and high evaporation.

At Akron, Colo., in 1909 the spring was cold and wet. Under these conditions we would not expect marked differences between spring-plowing and summer-tillage methods. The average yield at the station was about 16 bushels, with a seasonal rainfall of 10 inches.

At Hays, Kans., in 1908 the average yield was only about 4 bushels with a seasonal rainfall of 14 inches. This low yield was due to high winds and dry weather in the spring months. The crop in 1909 was destroyed by hail.

At Garden City, Kans., in 1909 the average yield of wheat was 3 bushels per acre, with a seasonal rainfall of 11 inches. There was 2 inches of precipitation in March, which provided sufficient moisture for the germination of the wheat, but there was practically no precipitation during April and the first half of May, which so weakened the crop that the later rains could not be utilized.

The crop at Dalhart, Tex., in 1908 was destroyed by drought. In 1909 the spring was very dry, less than 3 inches of water falling from September 1 to May 1. Wheat grown on summer-tilled land was the only plat that was able to withstand this weather. A hailstorm on June 19 completed the destruction of those crops that had been weakened by the drought, and injured the wheat on the summer-tilled plat, which, however, gave a yield of 10.5 bushels per acre, with a seasonal rainfall of only 8 inches.

Spring wheat at Amarillo, Tex., during the season of 1907 was a failure, owing to the extremely dry weather of the spring and early summer, combined with the severe hailstorm of June 3. The average yield was only about 2 bushels per acre. In 1908 an average yield of about 12 bushels was obtained on a seasonal rainfall of 12.6 inches. March was very dry during this season, but good rains were

recorded in April and May, which explains the equality in yield of the spring-plowed and summer-fallowed plats. In 1909, April and May were very dry, while good rains fell in June. Here again we find the conditions under which conservation methods become especially effective, namely, a dry spring followed by timely summer rains. The wheat sown on spring-plowed land at Amarillo during this season was a failure, while the wheat on summer-tilled land gave a yield of 10.5 bushels on a seasonal rainfall of 8.5 inches.

In comparing the seasonal rainfall with the yields for all the stations it will be seen that when the rainfall from April to July, inclusive, is less than 8 inches the yields are hardly sufficient to cover the expense of producing the crop. With a seasonal rainfall of 8 to 10 inches the yield of wheat grown on summer-tilled land is generally considerably higher than wheat grown on spring-plowed land. When, however, the seasonal precipitation is above 10 or 12 inches, the increased returns from the method of alternate cropping and summer tillage do not exceed the returns from wheat grown in rotation or on spring plowing by an amount sufficient to offset the increased cost of summer tillage.

YIELD IN RELATION TO RAINFALL IN SOUTHERN TEXAS.

THE THREE YEARS' RECORD AT SAN ANTONIO.

Field experiments have also been conducted by the Office of Western Agricultural Extension of the Bureau of Plant Industry, during the past three years, at San Antonio, Tex. The normal rainfall of this region is about 26 inches, but the evaporation is equal to that on the high plains of Texas during the summer months, which, combined with the irregularity of the rainfall, often results in drought. The following table shows the yields of some of the standard crops of this region during three years in which there was a marked variation in the seasonal rainfall.

TABLE IV.—*Relation of yield to rainfall at San Antonio, Tex.*

Crop and year.	Yield per acre.	Seasonal rainfall.	Annual rainfall.
		Inches.	*Inches.*
Corn:			
1907	17.5 bushels	9.3	26
1908	27.4 bushels	10	27
1909	9.9 bushels	4.4	13
Cotton:			
1907	377 pounds	13	26
1908	1,096 pounds	17.7	27
1909	640 pounds	9.3	13
Sorghum:			
1907	3.1 tons	11.3	26
1908	13 tons	16.4	27
1909	1.9 tons	8.2	13

Referring to Table IV, it will be seen that the total rainfall for the year 1909 was only one-half that of either of the two preceding

years, in which the rainfall was about normal. The rain which fell each year during the growing season of each crop is given in the column headed "Seasonal rainfall."

The seasonal rainfall for corn is taken from March 1 to July 1; for cotton, from March 1 to October 1; for sorghum, from April 1 to October 1. The cotton yields include weight of both seed and fiber. The sorghum (Sumac) was grown in drills for forage, and two cuttings were made, the total yield being given in the table. The figures in all cases represent the average of a number of plats, varying from 8 to 46 in number each year in the case of the corn and cotton crops and from 3 to 4 in the case of the sorghum.

It will be noted that the yields increase with the seasonal rainfall in every instance except that of the cotton crop of 1907. The low yield in this case is due to an extremely dry August and September, only about 1 inch of rain falling during this time, which is a critical period in the growth of cotton in this region. The effect of the rainfall on the growth of sorghum is especially marked, the yield varying from 1.9 tons with a seasonal rainfall of 8 inches in 1909 to 13 tons per acre with a seasonal rainfall of 16 inches in 1908. This latter yield, which is extremely high, was the average of four plats, of which the lowest gave a yield of over 12 tons per acre. All of these four plats were cropped to either sorghum or cotton the previous year, and were plowed the preceding fall in time to take advantage of heavy fall and winter rains. The water which was stored in the soil as the result of the fall plowing, amounting probably to 6 or 8 inches of rainfall, was thus available to the crop in addition to the seasonal rainfall of 16 inches. But even granting that the sorghum had 24 inches of water during its growing period and assuming that the forage contained 20 per cent of water when weighed, this crop still shows the remarkable efficiency of 1 pound of dry material produced for every 260 pounds of water used.

SUMMER TILLAGE AT SAN ANTONIO.

The increased yield obtained on summer-tilled land during a dry season is strikingly illustrated in the results given in Table V, which were obtained at the San Antonio Experiment Farm in 1909.

TABLE V.—*Comparison of yields from crops grown on summer-tilled land and on land cropped the preceding year at San Antonio, Tex., 1909.*

Crop.	On land cropped in 1908.	On land summer tilled in 1908.
Cotton	596 pounds	783 pounds.
Corn	3.3 bushels	22.6 bushels.
Sorghum	1.9 tons	5 tons.
Oats	0.0 ton	1.25 tons.

Table V shows a comparison of yields obtained on summer-tilled land and on land cropped the preceding year. With the exception of the cotton crop, the increased yield resulting from summer tillage is very marked. The cotton on cropped land was greatly helped by seasonal rains during July and August, a critical period with this crop. The yield of corn on the cropped land was only one-sixth and of sorghum one-third that on summer-tilled land. Oats grown as a hay crop during the winter months were a failure except on the summer-tilled land. These results were obtained during an exceedingly dry year. Usually the rainfall of this region is sufficient to make crop rotations practicable, although cultivated crops should be used as far as possible.

NORMAL PRECIPITATION OF THE WESTERN UNITED STATES.

Table VI has been specially compiled for this bulletin, principally from the numerous reports of the United States Weather Bureau, and includes the rainfall records available to January, 1910. The table gives the station, the county in which the station is located, the elevation of the station above sea level, the normal precipitation[a]—that is, the average annual precipitation for a number of years—and the number of years of records upon which the normal is based, ending with the year given in the table.

In the state rainfall maps (figs. 6–23) each number on the map represents the normal rainfall at the station located at that point. These maps, which were prepared from the figures given in the tables, show the distribution of the rainfall in each State. The heavy curved lines drawn through the maps pass through points having approximately the same rainfall. The amount of rainfall in inches represented by each line is shown by the numbers at the ends of the line. These lines have been drawn when possible to represent differences of 5 inches in the rainfall. For example, in the Kansas map one line passes through points having an annual rainfall of 20 inches, another line through points where the rainfall is 25 inches, and so on. In some States there are found separated regions which have the same rainfall, as in Colorado. These lines have been located by means of the figures given on the map, so that the figures are to be considered rather than the lines. The county boundaries in each State have been revised to date from the maps of the Post-Office Department. The precipitation tables and maps will be found arranged alphabetically according to States.

[a] The term "precipitation" is used so as to include both rain and snow. The snow that falls into the gauge in the winter is melted, and the water is measured and treated in the records as rain. The records, then, include the total precipitation for the year, whether rain or snow, but measured always as rain.

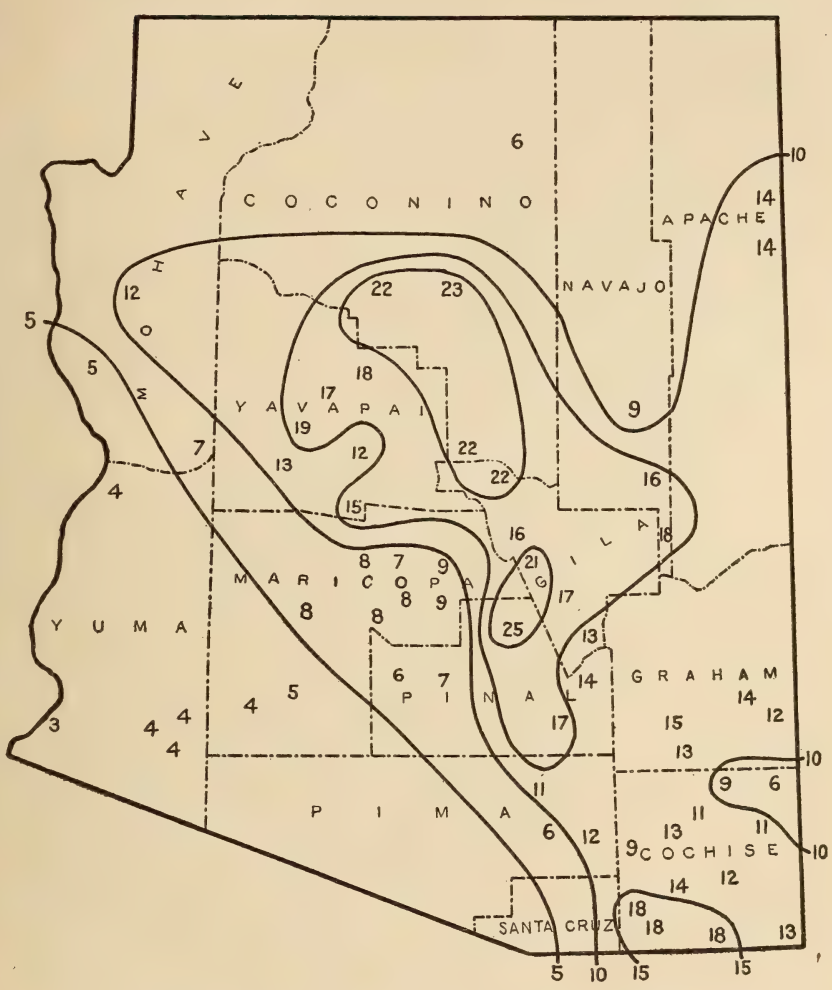

FIG. 6.—Rainfall map of Arizona. The figures show the average annual rainfall in inches.

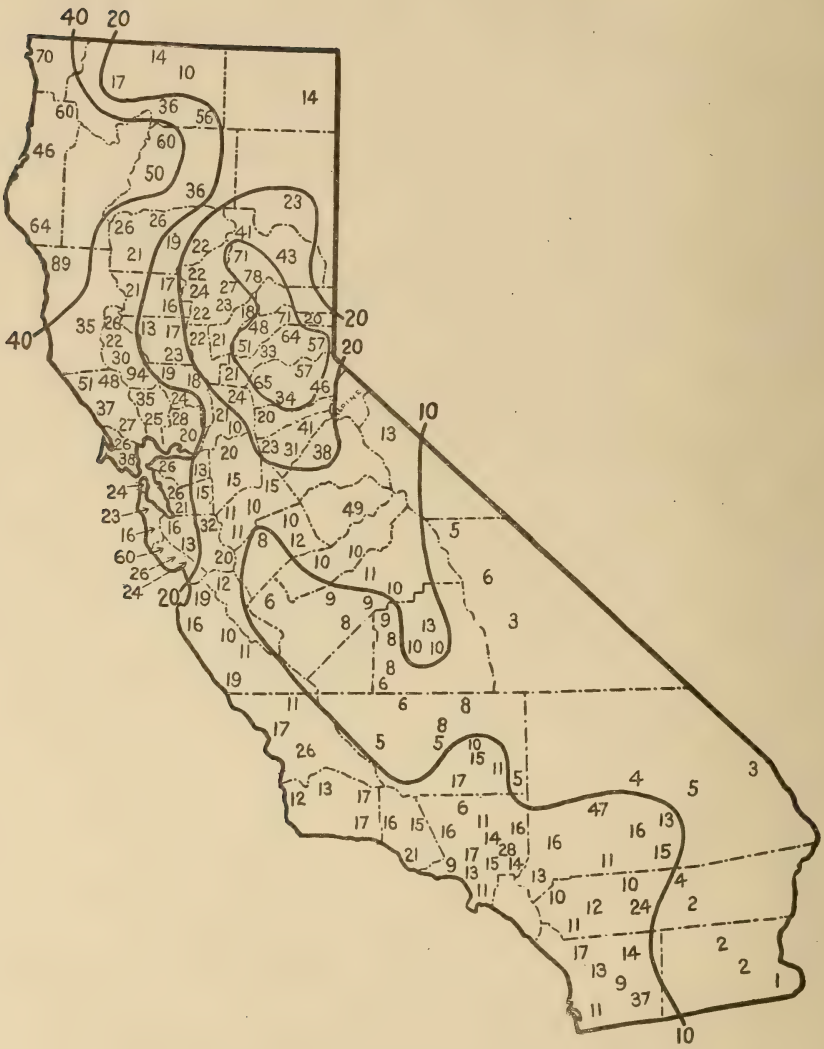

FIG. 7.—Rainfall map of California. The figures show the average annual rainfall in inches.

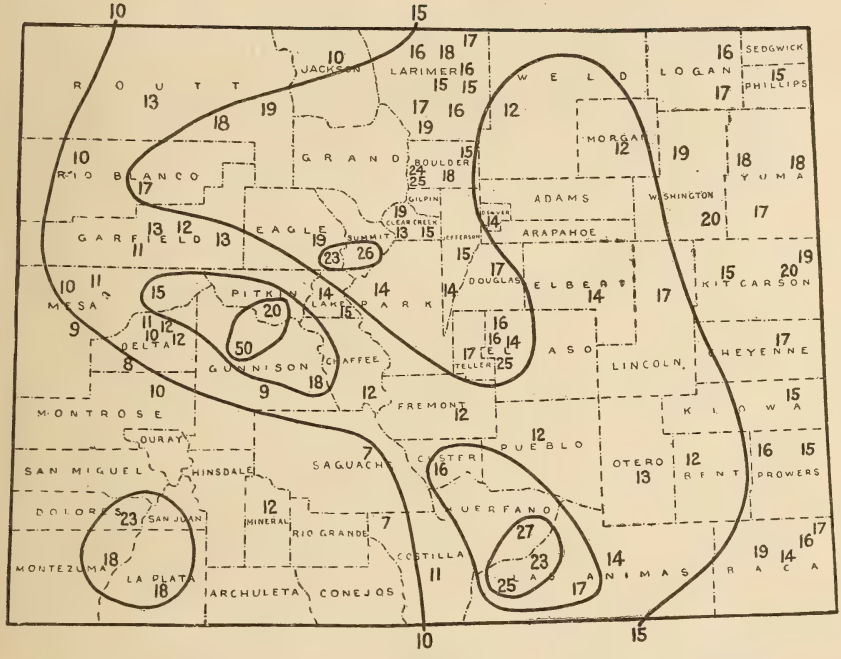

FIG. 8.—Rainfall map of Colorado. The figures show the average annual rainfall in inches.

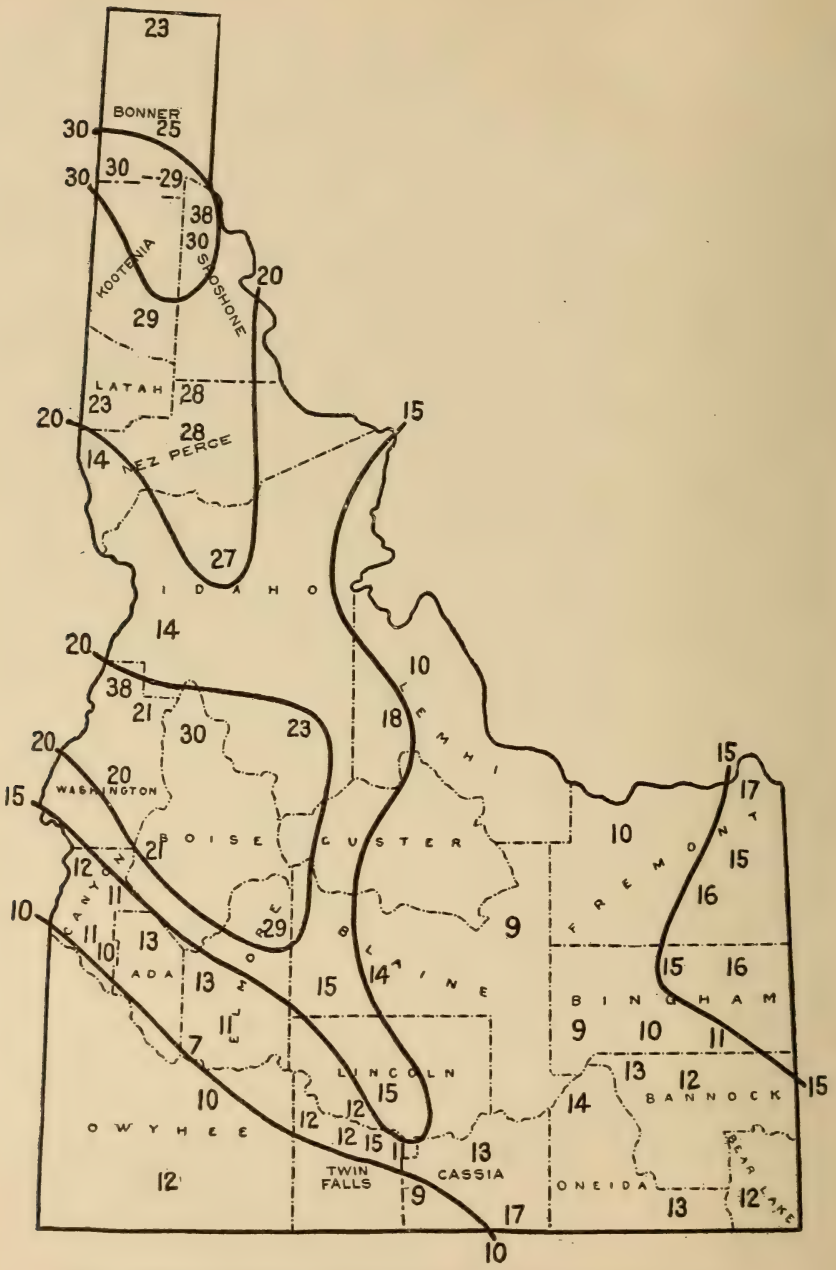

FIG. 9.—Rainfall map of Idaho. The figures show the average annual rainfall in inches.

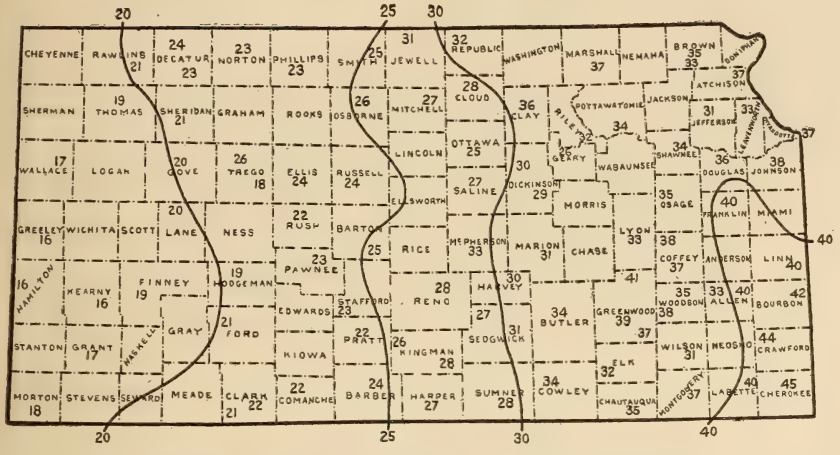

FIG. 10.—Rainfall map of Kansas. The figures show the average annual rainfall in inches.

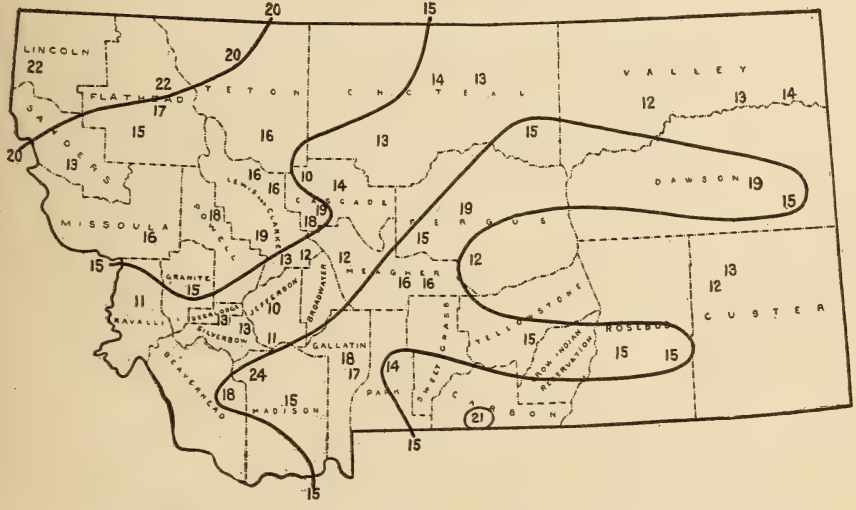

FIG. 11.—Rainfall map of Montana. The figures show the average annual rainfall in inches.

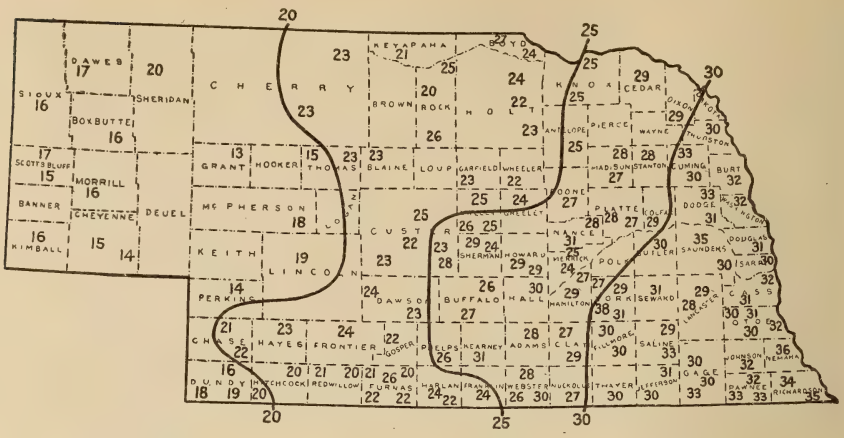

FIG. 12.—Rainfall map of Nebraska. The figures show the average annual rainfall in inches.

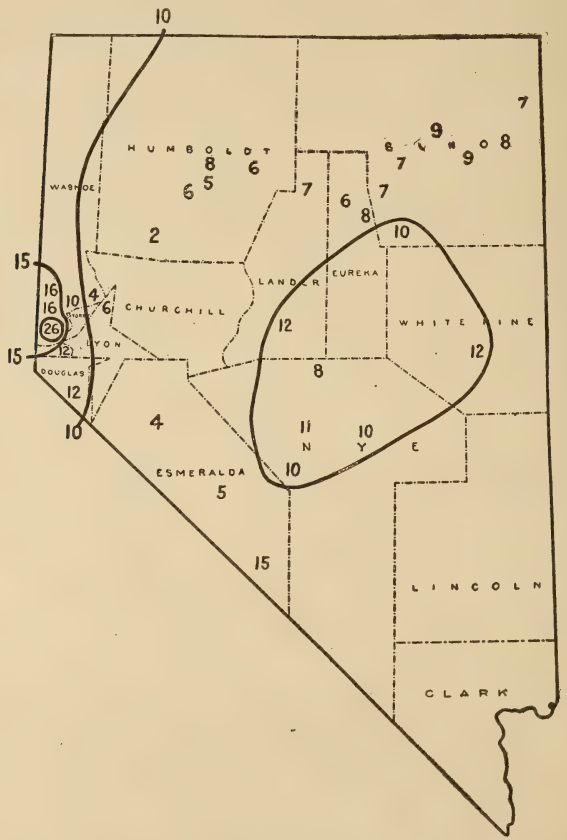

FIG. 13.—Rainfall map of Nevada. The figures show the average annual rainfall in inches.

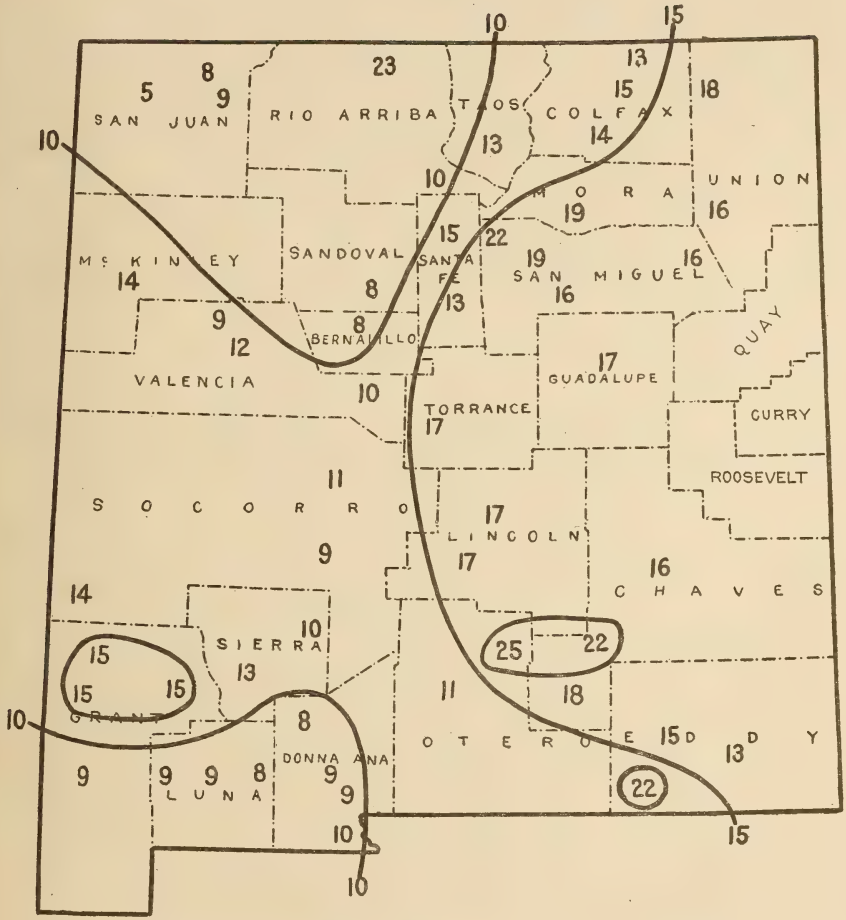

FIG. 14.—Rainfall map of New Mexico. The figures show the average annual rainfall in inches.

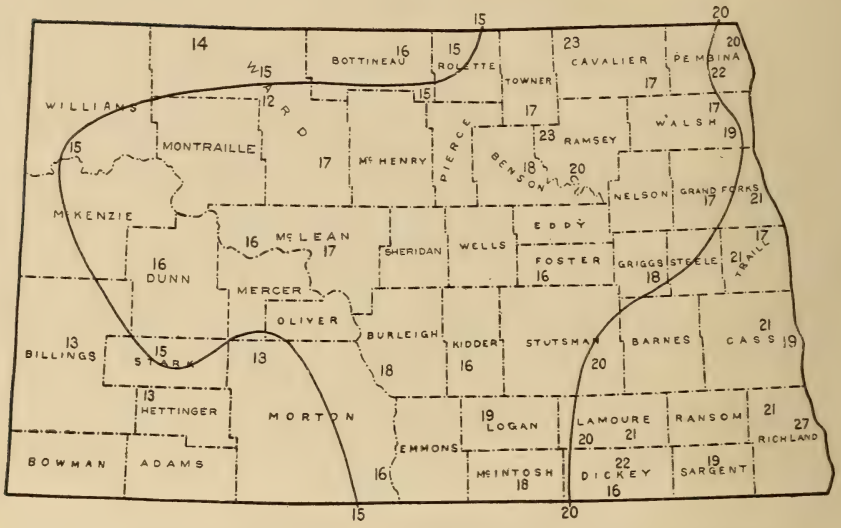

FIG. 15.—Rainfall map of North Dakota. The figures show the average annual rainfall in inches.

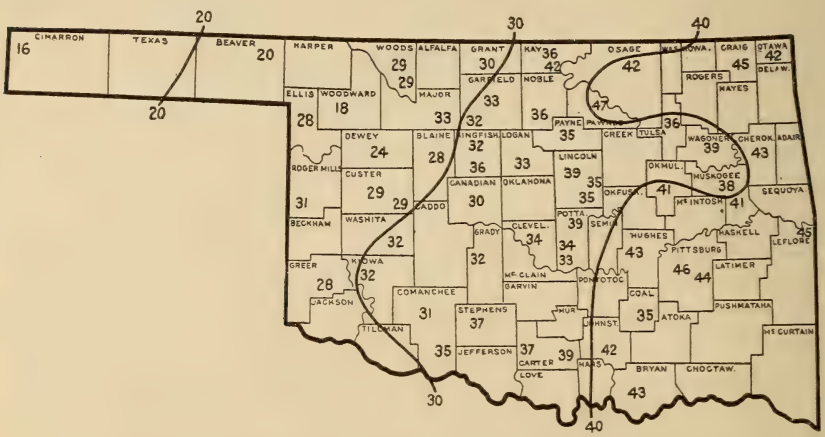

FIG. 16.—Rainfall map of Oklahoma. The figures show the average annual rainfall in inches.

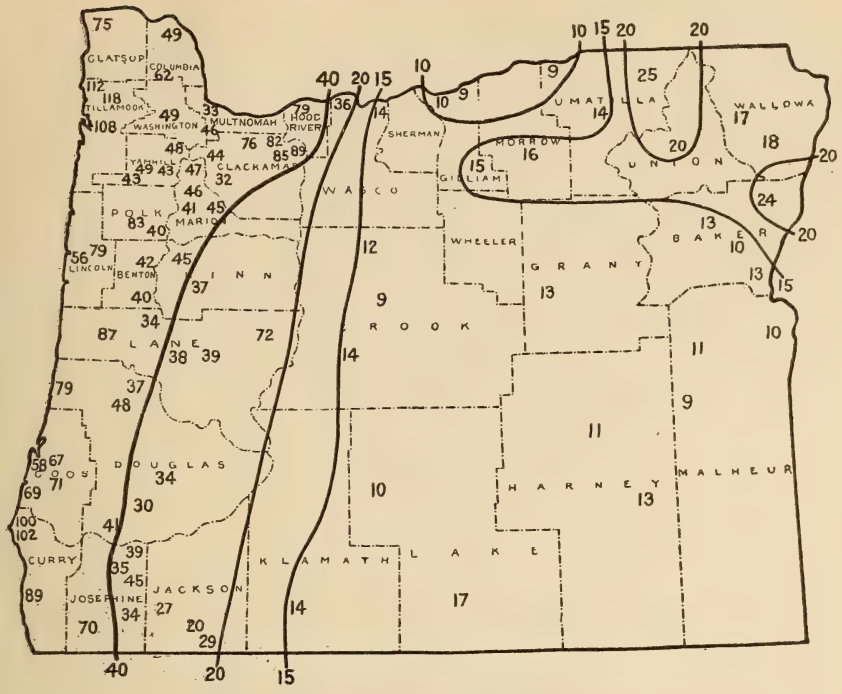

FIG. 17.—Rainfall map of Oregon. The figures show the average annual rainfall in inches.

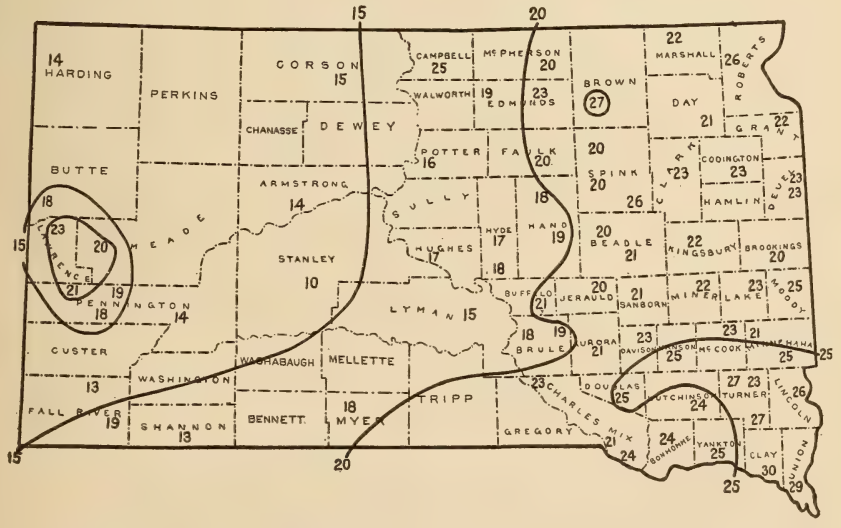

FIG. 18.—Rainfall map of South Dakota. The figures show the average annual rainfall in inches.

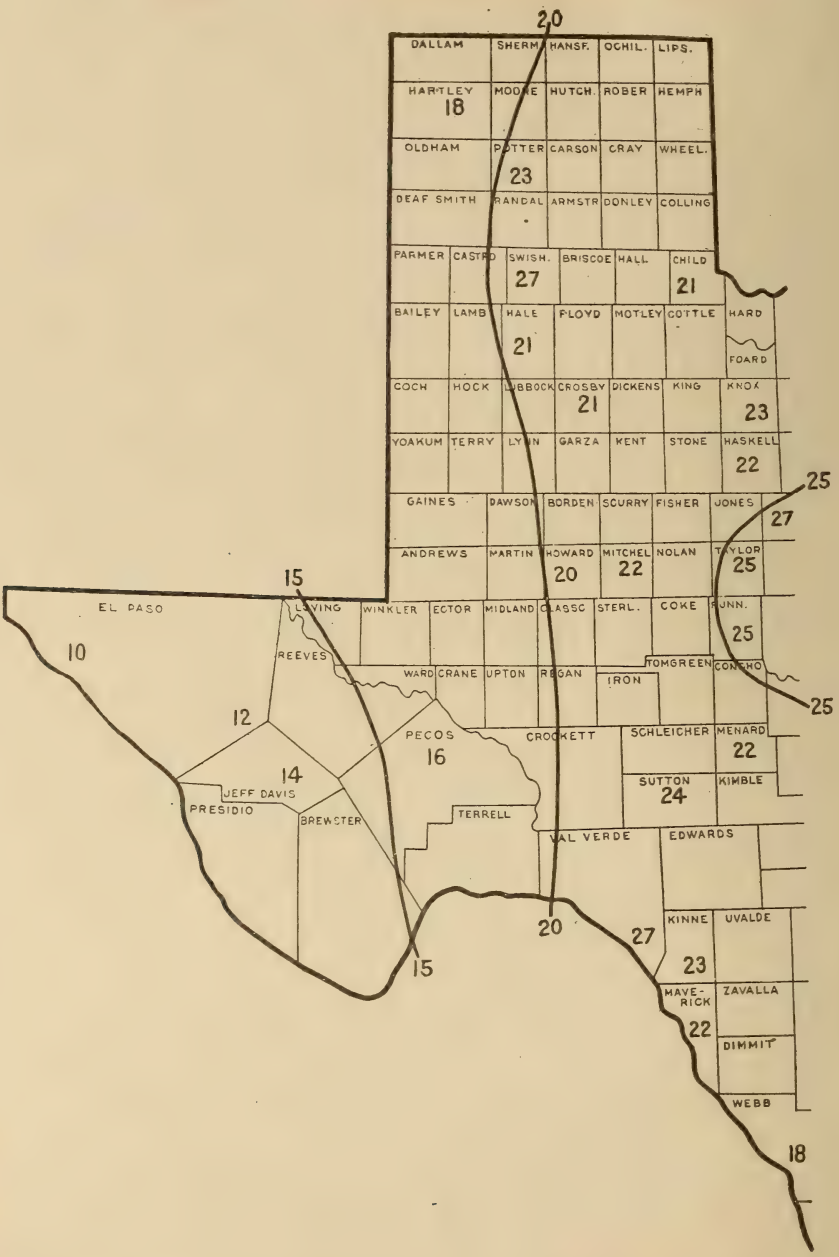

FIG. 20.—Rainfall map of Texas, western part. The figures show the average annual rainfall in inches.

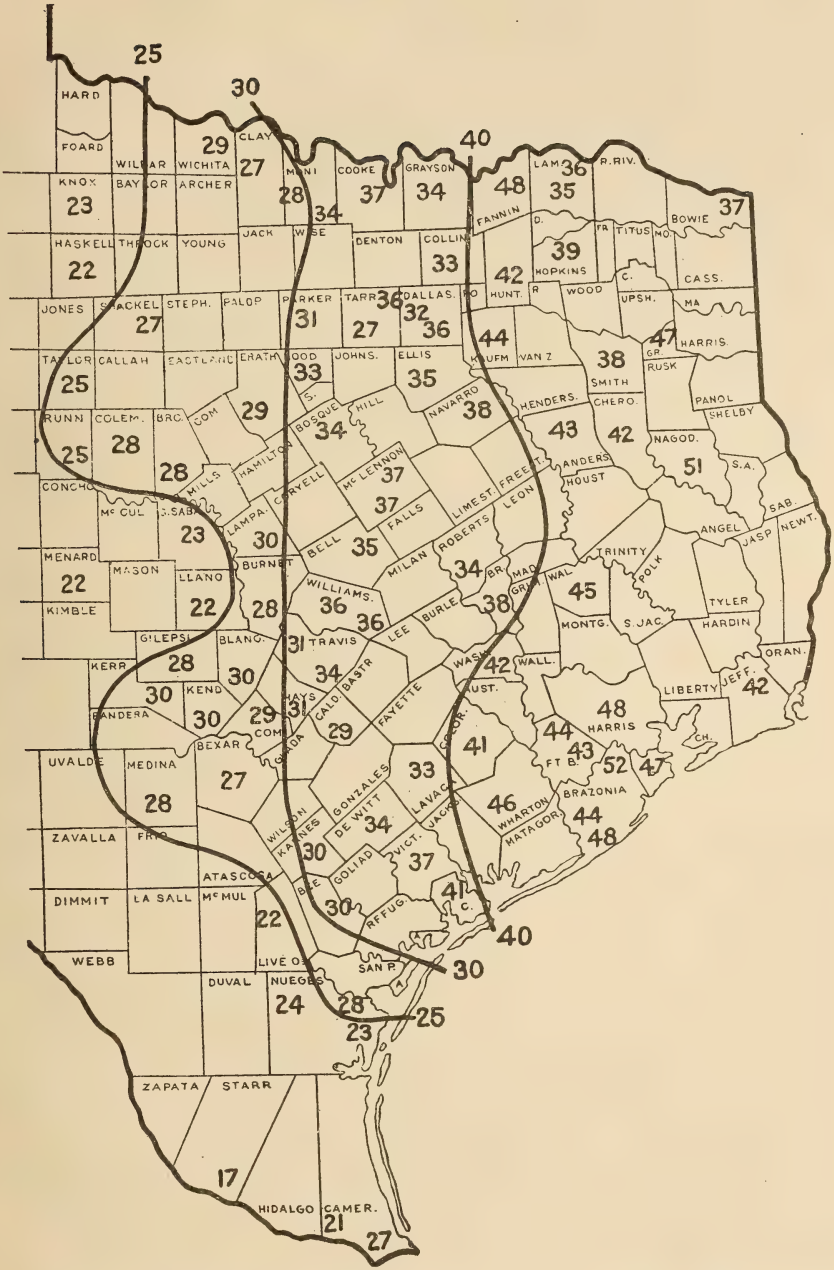

FIG. 19.—Rainfall map of Texas, eastern part. The figures show the average annual rainfall in inches.

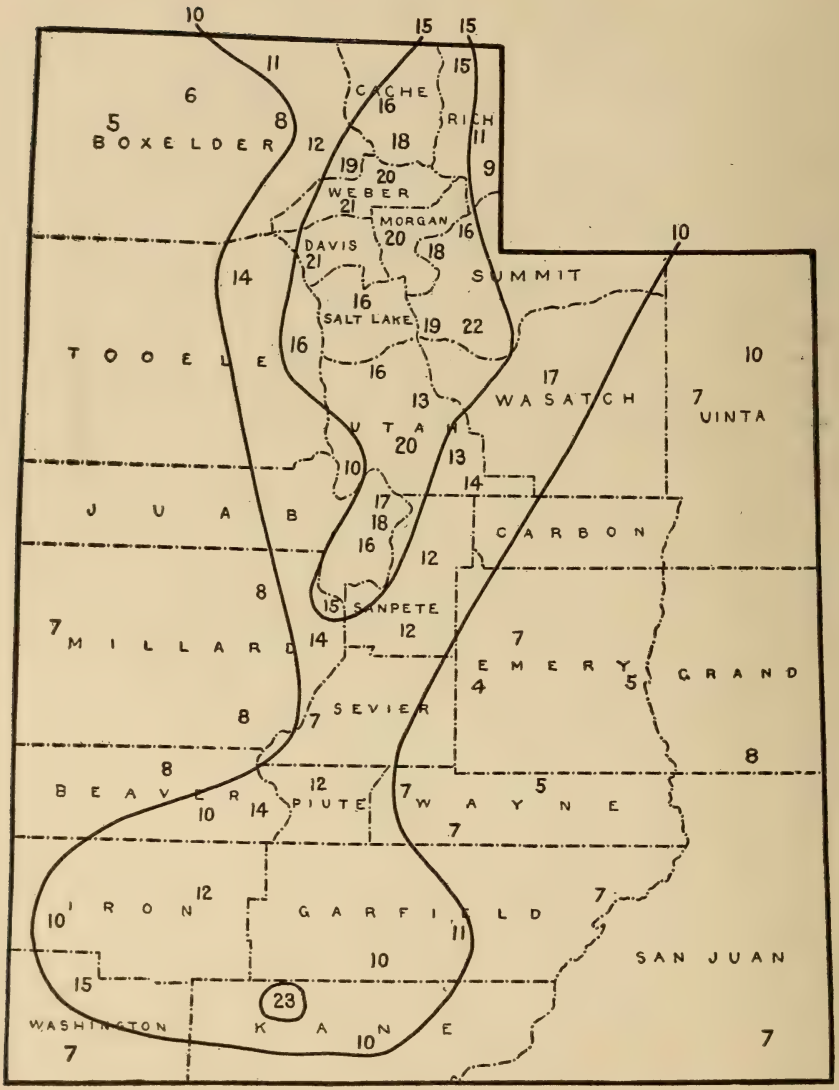

FIG. 21.—Rainfall map of Utah. The figures show the average annual rainfall in inches.

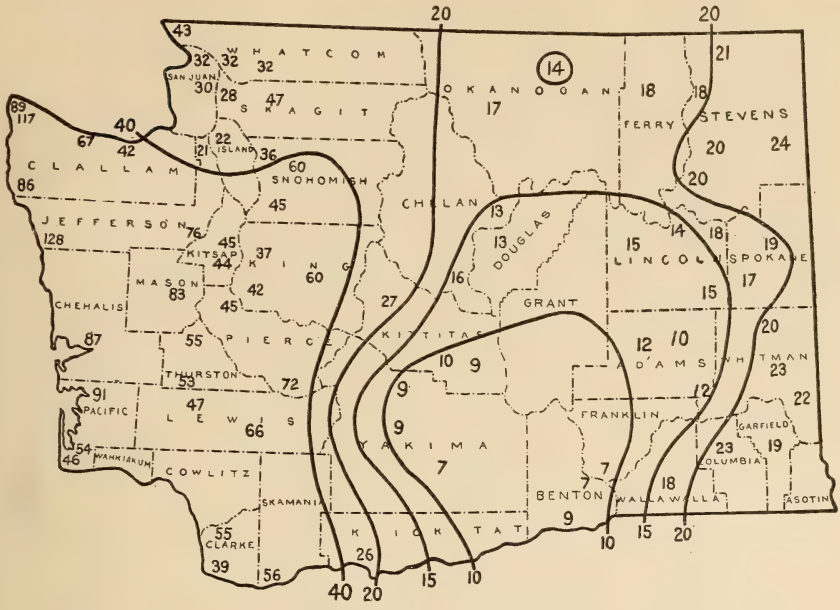

FIG. 22.—Rainfall map of Washington. The figures show the average annual rainfall in inches.

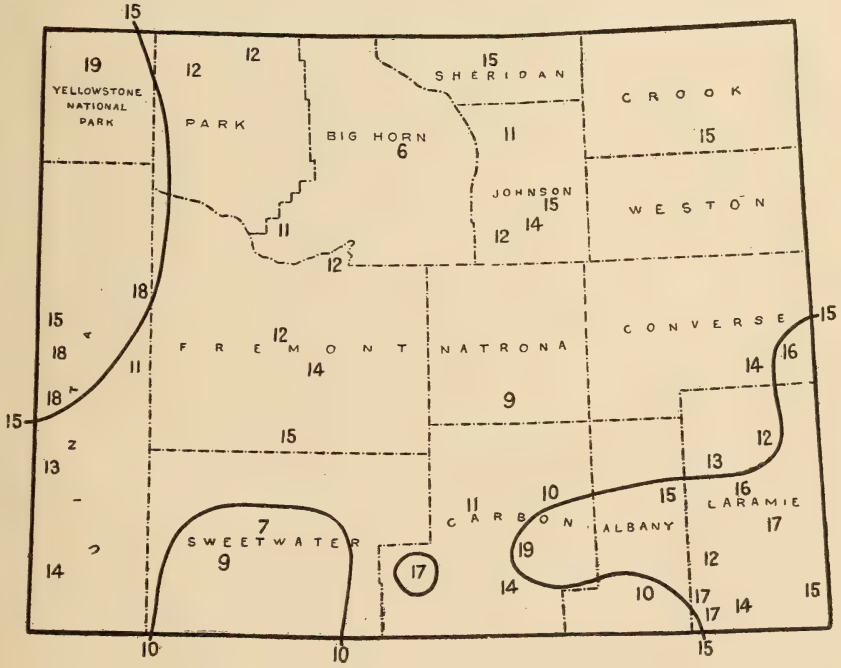

FIG. 23.—Rainfall map of Wyoming. The figures show the average annual rainfall in inches.

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States.*

ARIZONA.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Allaires Ranch	Cochise	4,184	12	1908	11.6
Arizona Canal Dam	Maricopa	1,372	16	1908	9.2
Aztec	Yuma	492	10	1908	4.3
Benson	Cochise	3,523	24	1908	9.0
Bisbee	do	5,500	18	1908	17.7
Bonita	Graham	4,916	28	1908	13.3
Bowie	Cochise	3,756	9	1908	10.8
Buckeye	Maricopa	980	17	1908	7.8
Casagrande	Pinal	1,396	21	1906	7.1
Clifton	Graham	3,619	16	1907	13.8
Cline	Gila	2,300	9	1908	15.9
Cochise	Cochise	4,219	10	1908	10.5
Columbia	Yavapai	1,900	10	1908	15.4
Congress	do	3,688	12	1908	13.2
Crittenden, Camp	Pima	2,000	5	1872	16.5
Date Creek, Camp	Yavapai	3,726	6	1873	14.2
Douglas	Cochise	3,930	6	1908	13.4
Dragoon	Cochise	4,611	9	1902	12.5
Dudleyville	Pinal	2,360	20	1908	14.0
Experiment Station Farm	Maricopa	1,092	15	1907	7.3
Flagstaff	Coconino	6,907	17	1908	23.2
Florence	Pinal	1,553	9	1890	9.5
Fort Apache	Navajo	5,200	29	1908	18.1
Fort Bowie	Cochise	4,781	23	1890	15.4
Fort Defiance	Apache	6,950	8	1905	13.5
Fort Grant	Graham	4,916	23	1903	14.9
Fort Huachuca	Cochise	5,100	23	1908	18.0
Fort Lowell	Pima	2,400	19	1890	12.4
Fort McDowell	Maricopa	1,250	24	1890	10.4
Fort Mohave	Mohave	604	15	1904	5.1
Fort Thomas	Graham	2,700	10	1890	11.8
Fort Verde	Yavapai	3,160	22	1890	13.1
Gila Bend	Maricopa	737	18	1908	5.4
Globe	Gila	3,525	6	1908	16.5
Holbrook	Navajo	5,069	19	1908	8.8
Jerome	Yavapai	4,743	12	1908	18.3
Kingman	Mohave	3,326	7	1908	11.8
Maricopa	Pinal	1,186	26	1908	6.0
Mesa	Maricopa	1,244	13	1908	8.8
Mohawk Summit	Yuma	538	7	1907	3.7
Mount Huachuca	Cochise	5,000	12	1902	18.3
Natural Bridge	Gila	4,990	18	1908	21.7
Oracle	Pinal	4,500	13	1906	17.1
Oro	Graham	3,610	11	1904	12.3
Pantano	Pima	3,536	10	1900	12.3
Parker	Yuma	345	10	1905	4.4
Peoria	Maricopa	1,200	9	1900	8.0
Phoenix	do	1,108	14	1908	7.9
Phoenix (A)	do	1,092	18	1908	7.5
Pinal Ranch	Pinal	4,520	14	1908	24.9
Prescott	Yavapai	5,660	29	1908	17.3
Roosevelt	Gila	1,983	4	1908	21.2
St. Michael	Apache	6,950	12	1908	13.5
San Carlos	Gila	2,456	21	1908	12.8
San Simon	Cochise	3,609	19	1908	6.4
Sentinel	Maricopa	685	10	1908	3.6
Showlow	Navajo		a 8	1902	15.8
Signal	Mohave	1,652	16	1908	7.4
Strawberry	Coconino	5,875	5	1901	21.5
Texas Hill	Yuma	353	11	1899	3.5
Tombstone	Cochise	4,550	10	1908	14.2
Tuba	Coconino		7	1906	6.0
Tucson	Pima	2,390	29	1908	10.7
Vail	do	3,241	10	1908	5.8
Walnut Grove	Yavapai	3,649	14	1908	12.3
Wickenburg	Maricopa	1,400	7	1885	9.9
Willcox	Cochise	4,164	27	1908	8.5
Williams	Coconino	6,750	7	1908	21.5
Yarnell	Yavapai	4,700	11	1908	18.9
Yuma	Yuma	141	28	1908	3.1

a Except for December.

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

CALIFORNIA.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Agnew	Santa Clara	30	7	1898	13.9
Alosta	Los Angeles	600	6	1886	25.4
Alta	Placer	3,612	16	1885	42.1
Anaheim	Orange	134	27	1904	11.5
Angiola	Tulare	208	6	1905	5.6
Antioch	Contra Costa	46	29	1907	12.6
Aptos	Santa Cruz	102	24	1908	25.6
Athlone	Merced		5	1890	11.3
Auburn	Placer	1,360	38	1908	33.5
Azuza	Los Angeles	540	11	1908	13.9
Bagdad	San Bernardino	784	6	1908	4.5
Bakersfield	Kern	404	20	1908	4.8
Barstow	San Bernardino	2,105	6	1908	4.1
Benicia Barracks	Solano	64	36	1890	16.3
Berendo	Madera	256	11	1899	10.1
Berkeley	Alameda	317	22	1908	26.4
Big Dry Creek	Fresno	435	7	1878	16.6
Biggs	Butte	98	10	1908	21.8
Bishop	Inyo	4,450	13	1907	4.7
Blue Canyon	Placer	4,695	10	1908	64.1
Boca	Nevada	5,531	35	1904	20.1
Bodie	Mono	8,248	12	1906	13.0
Borden	Fresno	328	16	1890	9.0
Boulder Creek	Santa Cruz	470	11	1899	59.6
Bowmans Dam	Nevada	5,500	25	1903	71.4
Branscomb	Mendocino	2,000	9	1908	88.8
Brentwood	Contra Costa	80	20	1899	13.5
Brighton	Sacramento	53	13	1890	17.2
Byron	Contra Costa	33	26	1905	13.0
Cabazon	Riverside	1,779	13	1908	9.6
Caliente	Kern	1,290	33	1908	10.6
Calistoga	Napa	363	37	1908	35.0
Campbell	Santa Clara	217	12	1908	13.2
Castroville	Monterey	17	11	1899	17.0
Cedarville	Modoc	4,675	15	1908	13.9
Central Point	Merced	117	7	1886	9.7
Cherokee	Butte		11	1884	44.9
Chico	do	189	39	1908	22.4
Chino	San Bernardino	714	16	1908	13.2
Cisco	Placer	5,939	39	1908	49.7
Claremont	Los Angeles	1,200	17	1908	16.0
Cloverdale	Sonoma	340	7	1908	47.9
Colegrove	Los Angeles	300	8	1890	21.3
Colfax	Placer	2,421	39	1908	46.6
Colton	San Bernardino	965	28	1904	10.5
Colusa	Colusa	60	26	1908	16.6
Corning	Tehama	277	23	1908	20.8
Craftonville	San Bernardino	1,759	17	1908	13.1
Crescent City	Del Norte	50	18	1907	70.2
Crystal Springs	San Mateo	220	9	1884	38.2
Cuyamaca	San Diego	4,677	10	1908	37.4
Davisville	Yolo	51	37	1908	16.5
Delano	Kern	319	33	1908	6.1
Delta	Shasta	1,138	26	1908	60.1
Dinuba	Tulare	335	6	1899	8.6
Drytown	Amador	790	13	1904	29.6
Dunnigan	Yolo	65	32	1908	19.1
Dunsmuir	Siskiyou	2,285	20	1908	56.3
Durham	Butte	160	25	1908	23.7
East Brother (L. H.)	Contra Costa	63	15	1890	8.3
Edmanton	Plumas	4,730	10	1902	70.7
El Cajon	San Diego	482	9	1908	8.5
El Dorado	Eldorado	1,609	15	1903	37.2
Ellis	San Joaquin	76	8	1878	8.9
Elmira	Solano	75	18	1903	22.3
Elmwood	Stanislaus	126	8	1907	10.3
Elsinore	Riverside	1,234	14	1908	11.0
El Verano	Sonoma	104	10	1899	36.4
Emigrant Gap	Placer	5,230	35	1908	51.7
Escondido	San Diego	657	21	1908	13.5
Eureka	Humboldt	64	23	1908	45.9
Exeter	Tulare	392	7	1899	9.5
Fall Brook	San Diego	700	28	1903	17.3
Farallon Island	San Francisco	30	6	1908	18.9
Farmington	San Joaquin	111	31	1907	16.3

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

CALIFORNIA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Felton	Santa Cruz	275	10	1899	50.6
Fernando	Los Angeles	1,066	26	1903	14.2
Firebaugh	Fresno	150	14	1886	8.8
Florence	Los Angeles	153	10	1899	13.2
Folsom	Sacramento	252	37	1908	23.6
Fordyce Dam	Nevada	6,500	14	1908	70.7
Fort Bidwell	Modoc	4,640	24	1890	20.8
Fort Gaston	Humboldt	397	29	1890	55.4
Fort Humboldt	....do	50	13	1866	34.6
Fort Ross	Sonoma	100	33	1908	50.7
Fort Yuma	Imperial	276	28	1883	3.2
Fresno	Fresno	293	22	1908	9.0
Fruito	Glenn	624	20	1908	20.9
Galt	Sacramento	49	31	1908	18.2
Georgetown	Eldorado	2,650	36	1908	57.1
Gilroy	Santa Clara	193	35	1908	19.5
Girard	Kern	3,302	11	1899	12.1
Glendora	Los Angeles	.....	5	1899	27.6
Gold Run	Placer	3,222	10	1908	51.3
Gonzales	Monterey	127	10	1908	10.3
Goshen Junction	Tulare	286	21	1899	7.5
Grand Island	Colusa	65	6	1899	23.0
Grass Valley	Nevada	2,090	25	1899	50.8
Grayson	Stanislaus	55	14	1884	11.9
Greenville	Plumas	3,600	15	1908	40.9
Guadaloupe	Santa Barbara	.....	6	1899	11.9
Guinda	Yolo	350	11	1908	19.6
Hanford	Kings	249	9	1908	8.2
Haywards	Alameda	75	9	1899	21.1
Healdsburg	Sonoma	52	16	1908	40.9
Helen Mine	Lake	2,750	8	1908	93.5
Hollister	San Benito	284	35	1908	12.3
Hornbrook	Siskiyou	2,154	19	1907	14.4
Humboldt (L. H.)	Humboldt	8	15	1890	33.8
Huron	Fresno	367	11	1902	4.6
Idyllwild	Riverside	5,250	8	1908	23.8
Independence	Inyo	3,907	13	1908	5.6
Indio	Riverside	−20	31	1908	2.4
Ione	Amador	287	31	1908	19.9
Iowa Hill	Placer	2,825	30	1908	52.2
Isabella	Kern	2,500	7	1905	7.8
Jackson (near)	Amador	1,900	19	1902	32.8
Jamestown	Tuolumne	1,471	6	1908	38.4
Jolon	Monterey	.....	15	1899	19.2
Keeler	Inyo	3,620	24	1908	2.6
Keene	Kern	2,705	21	1899	14.5
Kennedy Gold Mine	Amador	1,500	11	1902	41.9
Kernville	Kern	2,600	5	1899	8.3
King City	Monterey	333	22	1908	10.9
Kingsburg	Fresno	301	20	1899	8.7
Knights Landing	Yolo	45	29	1906	18.2
Kono Tayee	Lake	1,325	21	1902	29.5
La Grange	Stanislaus	250	23	1890	16.6
Lakeport (near)	Lake	1,325	22	1903	22.8
La Porte	Plumas	5,000	15	1908	78.1
Lathrop	San Joaquin	25	21	1899	12.5
Laurel	Santa Cruz	910	11	1899	51.7
Le Grand	Merced	255	9	1908	12.2
Lemon Cove	Tulare	600	10	1908	12.5
Lemoore	Kings	227	20	1899	7.5
Lick Observatory	Santa Clara	4,209	28	1908	32.2
Livermore	Alameda	485	38	1908	15.3
Lodi	San Joaquin	45	21	1908	19.8
Los Angeles	Los Angeles	293	32	1908	17.3
Los Banos	Merced	121	36	1908	7.6
Los Gatos	Santa Clara	600	24	1908	32.4
Mammoth Tank	Imperial	257	31	1908	1.8
Manzana	Los Angeles	2,850	8	1901	5.8
Martinez	Contra Costa	10	21	1899	19.2
Marysville	Yuba	67	38	1908	17.5
Mendota	Fresno	177	14	1907	5.9
Menlo Park	San Mateo	64	31	1908	16.4
Merced	Merced	173	35	1908	10.3
Milton	Calaveras	660	19	1908	22.4
Modesto	Stanislaus	90	38	1908	9.9

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

CALIFORNIA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Mojave	Kern	2,751	31	1907	4.8
Mokelumne Hill	Calaveras	1,550	16	1908	31.2
Montague	Siskiyou	2,450	30	1908	10.4
Monterey	Monterey	15	51	1908	15.6
Monterio	Kern	4,500	9	1907	16.8
Mount Hamilton	Santa Clara	4,440	10	1890	34.3
Mount Tamalpais	Marin	2,375	10	1908	28.9
Mountain View	Santa Clara		13	1899	16.4
Napa City	Napa	20	31	1908	25.5
Napa (S. H.)	do	60	32	1908	25.2
Needles	San Bernardino	477	15	1906	2.8
Nevada City	Nevada	2,580	38	1908	55.8
New Almaden	Santa Clara	340	12	1899	23.4
Newark	Alameda	25	10	1899	17.7
Newcastle	Placer	970	16	1908	28.8
Newhall	Los Angeles	1,200	32	1908	15.6
Newman	Stanislaus	91	20	1908	11.2
Nicolaus	Sutter	42	12	1889	18.6
Niles (near)	Alameda	87	21	1906	19.4
Nordhoff (near)	Ventura	3,210	8	1905	15.8
North Bloomfield	Nevada	3,200	27	1908	53.5
North Hill Vineyard	Calaveras	660	13	1902	22.5
North Ontario	San Bernardino	1,750	6	1902	16.1
North San Juan	Nevada	2,130	7	1903	47.5
Norwalk	Los Angeles	95	10	1899	11.1
Oakdale	Stanislaus	156	15	1908	15.4
Oakland	Alameda	36	35	1908	25.0
Ogilby	Imperial	354	14	1903	1.1
Oleta	Amador	1,510	10	1901	37.0
Ontario (near)	San Bernardino	860	11	1904	12.8
Orland	Glenn	254	27	1908	17.0
Orleans	Humboldt	520	6	1908	59.9
Oroville (near)	Butte	250	25	1908	27.0
Pajaro	Monterey	22	25	1899	19.1
Palermo	Butte	213	18	1908	23.1
Palm Springs	Riverside	584	20	1908	3.7
Pasadena	Los Angeles	828	6	1899	14.5
Paso Robles	San Luis Obispo	800	22	1908	15.0
Peachland	Sonoma	190	13	1908	37.4
Petaluma	do	10	19	1890	23.8
Pigeon Point	San Mateo	150	13	1888	17.8
Pilarcitos	do	620	20	1884	54.8
Pilot Creek	Eldorado	4,000	5	1899	64.7
Pine Crest	Santa Barbara	1,000	11	1908	17.3
Placerville	Eldorado	1,875	32	1908	45.6
Pleasanton	Alameda	353	21	1899	17.2
Point Ano Nuevo (L. H.)	San Mateo		15	1890	23.0
Point Arena (L. H.)	Mendocino	156	15	1890	30.8
Point Bonita (L. H.)	Marin	124	15	1890	24.2
Point Conception (L. H.)	Santa Barbara	258	14	1890	13.4
Point Lobes	San Francisco	250	16	1908	19.1
Port Los Angeles	Los Angeles	25	6	1899	8.7
Point Montara (L. H.)	San Mateo		15	1890	23.8
Point Reyes	Marin	490	17	1908	25.8
Pollasky	Fresno	1,200	6	1902	10.5
Pomona	Los Angeles	860	9	1902	14.3
Porterville	Tulare	464	20	1908	8.4
Poway	San Diego	460	25	1908	13.3
Princeton	Colusa	57	14	1887	15.2
Puente	Los Angeles	320	10	1899	14.0
Quincy	Plumas	3,400	14	1908	43.2
Ravenna	Los Angeles	2,262	19	1899	10.5
Red Bluff	Tehama	307	32	1908	26.1
Redding	Shasta	552	34	1908	36.1
Redlands	San Bernardino	1,352	16	1908	14.7
Reedley	Fresno	347	9	1908	10.3
Represa	Sacramento	305	12	1904	26.4
Rings Station	San Barnardino	4,300	8	1882	22.5
Riverside	Riverside	851	27	1908	10.0
Rio Vista	Solano	28	14	1906	17.6
Rocklin	Placer	249	38	1908	20.8
Rosewood	Tehama	865	10	1903	25.9
Sacramento	Sacramento	71	32	1908	20.9
Sacramento (2)	do	35	59	1908	19.4

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

CALIFORNIA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Salinas	Monterey	40	35	1908	15.0
San Andreas Reservoir	San Mateo	377	16	1884	46.0
San Ardo	Monterey	236	28	1902	9.7
San Bernardino	San Bernardino	1,054	38	1908	15.8
San Diego	San Diego	93	38	1908	10.5
San Francisco	San Francisco	207	38	1908	24.2
San Gabriel	Los Angeles	452	10	1899	15.3
San Gorgonio Pass	San Bernardino	2,560	10	1887	20.7
San Jacinto	Riverside	1,550	16	1908	11.7
San Jose	Santa Clara	95	34	1908	14.8
San Leandro	Alameda	50	12	1906	22.4
San Luis Obispo	San Luis Obispo	201	14	1908	21.5
San Mateo	San Mateo	22	35	1908	21.7
San Miguel	San Luis Obispo	616	22	1908	10.6
San Miguel Island	Santa Barbara	500	8	1901	10.9
San Pedro	Los Angeles	10	10	1899	11.0
San Rafael	Marin	56	1	1904	37.5
Sanger	Fresno	371	20	1908	10.7
Santa Ana	Orange	137	14	1902	12.1
Santa Barbara	Santa Barbara	130	41	1908	16.6
Santa Clara	Santa Clara	90	27	1908	16.1
Santa Cruz	Santa Cruz	20	31	1908	27.0
Santa Margarita	San Luis Obispo	996	20	1908	26.4
Santa Maria	Santa Barbara	220	23	1908	13.1
Santa Monica	Los Angeles	110	24	1908	13.4
Santa Paula	Ventura	350	15	1903	14.8
Santa Rosa	Sonoma	181	20	1908	30.7
Scott Valley	Siskiyou	2,570	30	1889	25.2
Selma	Fresno	311	23	1908	8.0
Shasta	Shasta	1,049	13	1908	49.9
Shingle Springs	Eldorado	1,415	10	1899	34.4
Sierra Madre	Los Angeles	1,400	12	1908	17.4
Sisson	Siskiyou	3,555	20	1908	36.1
Smartville	Yuba	800	9	1880	30.7
Soledad	Monterey	188	35	1908	9.0
Sonoma	Sonoma	30	18	1906	26.7
South Vallejo	Solano	23	18	1890	15.9
Spadra	Los Angeles	705	15	1890	12.8
Stockton (S. H.)	San Joaquin	23	59	1908	15.4
Storey	Madera	296	9	1908	9.8
Suisun	Solano	20	29	1908	19.9
Summerdale	Mariposa	5,270	12	1907	48.8
Summit	San Bernardino	7,017	38	1908	46.6
Sumner	Kern	422	14	1888	5.1
Susanville	Lassen	4,195	20	1908	22.9
Tehachapi	Kern	3,964	30	1906	10.5
Tehama	Tehama	220	38	1908	18.5
Tejon Rancho	Kern	1,500	7	1905	9.6
Templeton	San Luis Obispo	773	12	1899	17.2
Tennant	Santa Clara	335	7	1885	21.4
Tequisquita Rancho	do	244	8	1906	14.7
Towle	Placer	3,704	23	1908	51.7
Tracy	San Joaquin	64	29	1908	10.1
Traver	Tulare	291	13	1899	8.7
Tropico	Los Angeles	428	11	1899	14.8
Truckee	Nevada	5,819	38	1908	26.9
Tulare (near)	Tulare	274	15	1908	7.7
Turlock	Stanislaus	106	21	1899	10.2
Ukiah	Mendocino	620	32	1908	34.9
Upland	San Bernardino	1,750	12	1908	16.1
Upper Lake	Lake	1,350	24	1908	26.1
Upper Mattole	Humboldt	244	17	1903	63.7
Vacaville	Solano	175	29	1908	27.9
Valley Springs	Calaveras	673	20	1908	23.2
Ventura	Ventura	50	14	1905	21.1
Vina	Tehama	213	14	1902	21.5
Visalia	Tulare	334	21	1908	9.9
Volcano Springs	Imperial	220	17	1905	1.6
Walnut Creek	Contra Costa	75	10	1899	19.6
Wasco	Kern	336	9	1908	4.9
Watsonville	Santa Cruz	23	13	1908	23.8
Weaverville	Trinity	2,162	16	1885	38.3
Westley	Stanislaus	90	20	1908	10.6
West Butte	Sutter	90	10	1889	16.0
West Point	Calaveras		6	1899	40.5

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

CALIFORNIA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Wheatland	Yuba	84	22	1908	21.0
Whittier	Los Angeles	239	14	1902	12.2
Williams	Colusa	89	29	1905	12.9
Willow	Glenn	136	30	1908	15.5
Winters	Yolo	136	15	1903	23.6
Wire Bridge	Placer	565	8	1901	33.8
Woodland	Yolo	63	36	1908	17.7
Yerba Buena (L. H.)	San Francisco	345	12	1890	19.4
Yreka	Siskiyou	2,635	29	1901	16.8
Yuba City	Sutter	70	11	1902	22.0

COLORADO.

Akron	Washington	4,650	6	1908	19.1
Alford	Larimer	.....	11	1905	17.8
Alma	Park	10,228	10	1896	14.1
Ashcroft	Pitkin	9,483	9	1909	19.7
Blaine	Baca	3,935	18	1909	15.7
Boulder	Boulder	5,347	14	1909	18.2
Box Elder	Larimer	.....	12	1902	16.6
Breckenridge	Summit	9,536	19	1908	25.5
Burlington	Kit Carson	4,160	7	1909	20.4
Cannon City	Fremont	5,329	21	1909	12.2
Castle Rock	Douglas	6,220	18	1909	17.2
Cedar Edge	Delta	6,175	11	1902	11.3
Cheesman	Jefferson	6,890	7	1909	14.3
Cheyenne Wells	Cheyenne	4,279	16	1909	16.6
Clear View	Las Animas	9,500	17	1906	22.9
Collbran	Mesa	6,000	17	1909	15.0
Colorado Springs	El Paso	6,098	30	1909	14.3
Cope	Washington	.....	13	1909	19.5
Cripple Creek	Teller	9,396	9	1909	17.2
Crook	Logan	3,695	7	1899	15.9
Delta	Delta	4,965	20	1909	8.1
Denver	Denver	5,272	38	1909	14.0
Dumont	Clear Creek	8,000	10	1900	18.6
Durango	La Plata	6,534	17	1909	17.8
Fort Collins	Larimer	4,985	28	1909	14.8
Fort Garland	Costilla	7,937	22	1883	12.7
Fort Lewis	La Plata	8,500	10	1890	17.2
Fort Lyon	Bent	4,000	20	1889	11.1
Fort Massachusetts	Huerfano	8,365	6	1858	17.2
Fort Morgan	Morgan	4,319	12	1909	12.3
Fox	Yuma	.....	12	1903	16.6
Fruita	Mesa	4,510	11	1909	10.3
Garnett	Costilla	7,576	17	1909	6.6
Georgetown	Clear Creek	8,550	8	1909	12.5
Gilman	Eagle	8,500	14	1903	19.2
Glen Eyrie	El Paso	6,500	18	1909	15.9
Glenwood Springs (near)	Garfield	5,823	11	1908	13.1
Grand Junction	Mesa	4,608	19	1909	8.5
Grand Valley	Garfield	5,089	18	1909	12.6
Greeley	Weld	4,637	19	1909	12.3
Gunnison	Gunnison	7,670	17	1909	9.3
Hamps	Elbert	5,400	17	1909	14.0
Hermosa	La Plata	6,700	7	1882	14.3
Hoehne (near)	Las Animas	5,700	18	1909	13.9
Holly	Prowers	3,386	15	1909	14.8
Holyoke	Phillips	.....	7	1902	15.2
Hugo	Lincoln	5,068	7	1901	16.5
Husted (near)	El Paso	6,596	18	1904	15.8
Idaho Springs	Clear Creek	7,543	10	1909	15.1
Lake Moraine	El Paso	10,265	16	1909	25.1
Lamar	Prowers	3,592	20	1909	16.0
La Porte	Larimer	5,069	19	1909	15.6
Las Animas	Bent	3,899	42	1909	11.7
Lay	Routt	6,162	16	1909	12.5
Leadville	Lake	10,248	14	1909	13.8
Le Roy (near)	Logan	4,380	21	1909	16.5
Longmont	Boulder	4,935	8	1896	15.2
Longs Peak (near)	Larimer	8,600	13	1908	19.0
Mancos	Montezuma	6,960	11	1909	17.9

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

COLORADO—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Meeker	Rio Blanco	6,182	18	1909	17.1
Minneapolis	Baca	3,935	9	1899	17.0
Montrose	Montrose	5,811	21	1909	9.5
Moraine	Larimer	7,775	17	1906	16.9
Pagoda	Routt	6,500	19	1909	18.3
Paonia	Delta	5,694	15	1909	12.1
Parachute	Garfield	5,105	10	1904	11.0
Pikes Peak	El Paso	14,134	15	1888	28.7
Platte Cannon	Jefferson	5,492	6	1908	15.4
Pueblo	Pueblo	4,734	22	1909	12.1
Rangeley	Rio Blanco	5,050	11	1909	9.7
Red Cliff	Eagle	8,500	7	1896	23.0
Rico	Dolores	8,737	6	1896	22.8
Rocky Ford (near)	Otero	4,177	21	1909	13.1
Rogers Mesa	Delta	5,345	10	1903	9.8
Ruby	Gunnison	10,000	8	1902	50.0
Saguache	Saguache	7,745	17	1907	11.7
Salida	Chaffee	7,035	11	1909	7.2
San Luis	Costilla	7,794	19	1909	11.4
Santa Clara	Huerfano	8,500	11	1909	27.2
Seibert	Kit Carson	4,705	10	1901	15.0
Sheridan Lake	Kiowa	4,065	9	1909	14.9
Silt (near)	Garfield	5,441	12	1906	12.2
Smoky Hill Mine	Boulder	7,800	9	1898	24.6
Springfield	Baca	4,400	8	1899	19.0
Stamford	Las Animas	9,500	9	1898	24.6
Steamboat Springs	Routt	6,683	7	1909	18.8
Sugar Loaf	Boulder	7,800	13	1903	24.4
Surface Creek	Delta	6,175	6	1897	11.9
Thon	Elbert	6,500	9	1896	12.1
Trinidad	Las Animas	5,994	12	1906	17.2
Twin Lakes	Lake	9,200	9	1902	14.7
T. S. Ranch	Mesa	5,200	15	1901	11.3
Vilas	Baca	4,155	19	1909	14.1
Wagon Wheel Gap	Mineral	8,434	8	1906	11.9
Walden	Jackson	----------	6	1901	9.6
Wallet	Kit Carson	----------	8	1902	17.9
Waterdale	Larimer	5,206	15	1909	16.0
Westcliff	Custer	7,864	16	1909	16.1
White Pine	Gunnison	9,500	9	1909	17.7
Wray	Yuma	3,512	15	1908	18.0
Yuma	do	4,128	19	1909	17.9

IDAHO.

Albion	Cassia	----------	5	1904	13.1
American Falls	Oneida	4,341	16	1908	14.1
Atlanta	Elmore	7,000	5	1899	28.6
Blackfoot	Bingham	4,503	13	1908	9.7
Blue Lakes	Lincoln	3,225	2	1904	11.9
Boise	Ada	2,770	23	1908	12.7
Buhl	Twin Falls	3,800	2	1908	12.3
Burnside	Fremont	5,500	11	1903	10.4
Caldwell	Canyon	2,372	3	1907	11.2
Cambridge	Washington	2,651	13	1908	20.1
Chesterfield	Bannock	5,424	12	1908	12.3
Dent	Nez Perces	1,350	2	1908	27.7
Downey	Bannock	5,425	6	1901	9.3
Ellerslie	Elmore	3,500	3	1907	12.6
Emmett	Canyon	2,350	2	1908	11.4
Forney	Lemhi	----------	12	1908	18.2
Garnet	Elmore	2,575	9	1908	7.3
Grangeville	Idaho	3,500	5	1904	26.8
Gray	Bingham	----------	3	1899	11.4
Hailey	Blaine	5,347	4	1901	14.0
Hotspring	Owyhee	2,752	3	1908	10.4
Idaho Falls	Bingham	4,742	14	1908	14.6
Kellogg	Shoshone	2,330	3	1907	29.5
Kootenai	Bonner	1,750	8	1900	25.0
Lake	Fremont	6,700	16	1908	17.3
Lakeview	Bonner	2,250	12	1908	28.7
Landore	Washington	5,300	5	1908	37.9

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

IDAHO—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Lardo	Boise	5,050	4	1908	29.6
Lewiston	Nez Perces	757	15	1908	13.5
Lost River	Blaine	5,700	14	1908	9.4
Meadows	Washington	3,950	6	1908	21.2
Milner	Twin Falls	4,097	5	1908	11.0
Moscow	Latah	2,748	16	1908	22.6
Mountainhome	Elmore	3,150	3	1908	11.3
Murray	Shoshone	2,750	15	1908	37.6
Murtaugh	Twin Falls		2	1908	15.4
Oakley	Cassia	4,191	16	1908	9.3
Ola	Boise	3,100	11	1905	21.0
Orofino	Nez Perces	1,027	5	1908	28.4
Paris	Bear Lake	5,946	12	1908	12.2
Payette	Canyon	2,159	16	1908	12.0
Pocatello	Bannock	4,483	9	1908	12.9
Pollock	Idaho	2,050	9	1904	14.3
Poplars	Canyon	2,425	8	1908	10.3
Porthill	Bonner	1,665	16	1908	23.0
Priest River	do	2,078	8	1905	29.5
Riddle	Owyhee	6,200	3	1903	12.1
Roosevelt	Idaho	7,250	4	1906	23.4
Rupert	Lincoln	4,204	2	1908	15.1
St. Maries	Kootenai	2,062	12	1908	28.7
Salem	Fremont	5,000	3	1907	16.0
Salmon	Lemhi	4,040	3	1908	10.4
Soldier	Blaine	5,140	14	1908	14.9
Standrod	Cassia		3	1908	17.3
Swan Valley	Bingham	5,434	5	1899	15.8
Twin Falls	Twin Falls	3,825	3	1908	12.4
Vernon	Fremont		12	1908	14.5
Weston	Oneida	4,460	8	1905	13.1

KANSAS.

Abilene	Dickinson	1,157	21	1907	29.7
Achilles	Rawlins	2,827	12	1904	20.9
Agricultural College	Riley	1,100	50	1908	30.2
Altoona	Wilson	815	10	1901	31.4
Anthony	Harper	1,329	11	1907	26.6
Ashland	Clark	1,951	22	1908	21.9
Atchison	Atchison	973	23	1907	37.4
Baker	Brown	1,182	8	1908	34.9
Beloit	Mitchell	1,383	10	1903	26.7
Burlington	Coffey	1,010	15	1908	37.4
Clay Center	Clay	1,203	7	1908	35.5
Colby	Thomas	3,138	22	1908	19.4
Coldwater	Comanche	2,090	11	1908	22.0
Columbus	Cherokee	898	19	1908	44.5
Concordia	Cloud	1,398	24	1908	27.5
Coolidge	Hamilton	3,346	11	1908	15.8
Cunningham	Kingman	1,680	24	1907	25.5
Dodge City	Ford	2,513	34	1908	20.8
Dresden	Decatur	2,731	14	1908	23.0
Eldorado	Butler	1,291	6	1908	34.0
Ellinwood	Barton	1,788	22	1908	24.5
Emporia	Lyon	1,138	25	1908	33.3
Englewood	Clark	1,955	14	1906	21.0
Enterprise	Dickinson	1,144	6	1908	28.8
Eureka	Greenwood	1,093	14	1908	38.6
Fall River	do	925	12	1908	36.5
Farnsworth	Lane	2,850	8	1908	20.3
Fort Leavenworth	Leavenworth	788	50	1905	32.6
Fort Riley	Geary	1,070	4	1898	25.9
Fort Scott	Bourbon	857	16	1908	42.4
Frankfort	Marshall	1,146	14	1908	36.6
Garden City	Finney	2,836	22	1908	18.8
Gibson	Trego	2,475	10	1899	17.5
Gove	Gove	2,750	22	1908	20.4
Grenola	Elk	1,116	21	1908	32.2
Harrison	Jewell	1,804	7	1908	30.9
Hays	Ellis	2,000	39	1908	23.5
Horton	Brown	1,188	19	1908	33.1

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

KANSAS—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Hoxie	Sheridan	2,700	11	1908	20.9
Hutchinson	Reno	1,535	18	1908	28.4
Independence	Montgomery	816	36	1908	37.4
Iola	Allen	984	3	1908	33.2
Jetmore	Hodgeman	2,268	7	1908	19.1
Kansas City (Mo.)	Jackson	1,029	21	1908	37.3
Lacrosse	Rush	2,061	6	1908	21.9
Lawrence	Douglas	874	41	1908	36.3
Lebo	Coffey	1,138	22	1908	38.3
Lakin	Kearney	2,993	18	1908	16.4
Larned	Pawnee	2,090	13	1907	22.8
Lebanon	Smith	1,812	10	1908	24.9
McPherson	McPherson	1,495	18	1908	32.6
Macksville	Stafford	2,032	15	1908	22.7
Madison	Greenwood	1,074	7	1908	40.7
Manhattan	Riley	1,014	18	1908	32.1
Marion	Marion	1,310	15	1908	30.6
Medicine Lodge	Barber	1,475	13	1905	23.7
Minneapolis	Ottawa	1,259	19	1908	24.7
Moran	Allen	1,098	13	1908	40.0
Mount Hope	Sedgwick	1,410	11	1908	27.4
Newton	Harvey	1,454	11	1908	30.3
Norton	Norton	2,284	10	1908	22.6
Norwich	Kingman	1,496	12	1908	28.3
Oberlin	Decatur	2,539	21	1907	23.6
Olathe	Johnson	1,032	14	1908	37.8
Osage City	Osage	1,081	11	1908	35.2
Osborne	Osborne	1,557	21	1904	25.8
Oswego	Labette	899	19	1908	39.5
Ottawa	Franklin	926	14	1908	39.5
Phillipsburg	Phillips	1,939	22	1908	22.6
Pleasanton	Linn	862	6	1908	39.9
Pratt	Pratt	1,950	13	1908	22.1
Republic	Republic	1,495	6	1908	31.8
Rome	Sumner	1,218	22	1908	28.3
Russell	Russell	1,834	6	1908	23.8
Salina	Saline	1,227	24	1908	27.4
Sedan	Chautauqua	834	23	1908	34.9
Topeka	Shawnee	992	22	1908	33.8
Toronto	Woodson	1,040	11	1908	38.1
Tribune	Greeley	3,650	.....	1900	16.1
Ulysses	Grant	3,027	11	1908	16.6
Valley Falls	Jefferson	913	9	1908	31.1
Viroqua	Morton	3,215	12	1904	17.6
Wakeeney (near)	Trego	2,456	7	1907	26.1
Wallace	Wallace	3,303	39	1908	16.9
Walnut	Crawford	940	6	1908	44.0
Wamego	Pottawatomie	1,002	14	1908	33.9
Wichita	Sedgwick	1,377	21	1908	30.6
Winfield	Cowley	1,124	11	1908	33.5
Yates Center	Woodson	1,068	27	1908	35.2

MONTANA.

Adel	Cascade	5,200	9	1907	17.9
Agricultural College	Gallatin	4,700	11	1908	17.2
Anaconda	Deer Lodge	5,300	7	1908	12.9
Augusta	Lewis and Clark	4,071	10	1908	15.8
Billings	Yellow Stone	3,115	9	1908	14.9
Boulder	Jefferson	4,904	12	1905	9.6
Bozeman	Gallatin	4,700	5	1897	17.5
Busby	Rosebud	.....	6	1908	14.8
Butte	Silver Bow	5,716	15	1908	13.1
Canyon Ferry	Lewis and Clark	3,644	10	1908	12.1
Chinook	Chouteau	2,502	9	1906	13.1
Chouteau	Teton	.....	6	1897	15.5
Columbia Falls	Flathead	3,098	3	1908	22.2
Crow Agency	Rosebud	3,041	26	1908	14.5
Culbertson	Valley	1,927	6	1906	13.5
Dayton	Flathead	.....	5	1908	15.3
Dearborn Canyon	Lewis and Clark	4,590	6	1898	15.6
Dillon	Beaverhead	5,147	9	1908	18.3

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

MONTANA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Fort Benton	Chouteau	2,630	29	1908	13.2
Fort Keogh	Custer	2,350	22	1899	12.1
Fort Logan	Meagher	6,000	15	1902	12.3
Fort Shaw	Cascade	3,500	22	1908	10.4
Glasgow	Valley	----------	7	1900	12.0
Glendive	Dawson	2,069	19	1907	15.4
Great Falls	Cascade	3,350	18	1908	14.3
Hamilton	Ravalli	3,575	6	1908	11.2
Havre	Chouteau	2,505	29	1908	13.7
Helena	Lewis and Clark	4,110	29	1908	12.8
Hogan	do	4,590	6	1897	15.6
Kalispell	Flathead	2,965	10	1908	16.9
Kipp	Teton	4,472	6	1899	20.2
Lewistown	Fergus	4,010	11	1908	19.4
Livingston	Park	4,488	12	1908	14.0
Martinsdale	Meagher	4,800	11	1901	16.2
Marysville	Lewis and Clark	5,370	13	1906	18.6
Miles City	Custer	2,371	17	1908	13.2
Missoula	Missoula	3,225	28	1907	15.6
Ovando	Powell	4,207	8	1907	18.2
Philipsburg	Granite	5,273	5	1908	15.0
Plains	Sanders	2,473	10	1908	13.0
Poplar	Valley	2,020	24	1908	13.3
Red Lodge	Carbon	5,548	8	1908	21.1
Renova	Jefferson	4,383	10	1908	11.1
Springbrook	Dawson	----------	7	1908	19.2
St. Pauls	Chouteau	4,150	9	1904	15.1
St. Peter	Cascade	4,500	5	1905	18.7
Troy	Lincoln	1,881	14	1908	21.9
Twinbridge	Madison	4,650	4	1905	24.1
Two Dot	Meagher	4,800	12	1902	16.0
Utica	Fergus	5,000	15	1908	15.3
Virginia City	Madison	5,880	18	1897	15.1
Yale	Fergus	3,990	11	1905	12.2

NEBRASKA.

Agate	Sioux	----------	7	1906	15.7
Agee	Holt	----------	12	1903	23.9
Albion	Boone	1,747	11	1906	26.6
Alliance	Boxbutte	3,968	11	1906	16.4
Alma	Harlan	1,939	12	1909	24.0
Anoka	Boyd	----------	3	1909	26.9
Ansley	Custer	2,307	15	1904	22.5
Arapahoe	Furnas	2,173	7	1901	20.4
Arborville	York	----------	11	1902	27.4
Arcadia	Valley	2,186	10	1909	26.2
Ashland	Saunders	1,120	26	1909	30.3
Ashton	Sherman	2,061	15	1908	23.8
Auburn	Nemaha	1,051	17	1909	35.8
Aurora	Hamilton	1,792	13	1908	28.8
Bartley	Redwillow	2,325	6	1904	19.6
Bassett	Rock	2,323	6	1896	20.1
Beatrice	Gage	1,247	18	1909	30.2
Beaver City	Furnas	2,147	18	1909	21.9
Bellevue	Sarpy	1,210	27	1909	29.9
Benkelman	Dundy	2,968	9	1903	19.3
Blair	Washington	1,122	14	1909	32.2
Bluehill	Webster	1,967	14	1908	27.9
Bradshaw	York	1,715	11	1909	37.5
Bridgeport	Morrill	3,800	13	1909	16.1
Brokenbow	Custer	2,477	14	1909	25.2
Burchard	Pawnee	1,377	14	1908	32.9
Burwell	Garfield	2,180	17	1907	23.1
Callaway	Custer	2,555	12	1906	22.7
Cambridge	Furnas	2,258	2	1909	20.5
Central City	Merrick	1,708	11	1900	23.9
Columbus	Platte	1,441	16	1909	27.0
Creighton	Knox	1,600	11	1899	24.5
Crete	Saline	1,368	26	1909	29.2
Culbertson	Hitchcock	2,565	21	1908	19.7
Curtis	Frontier	2,553	10	1905	23.5

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

NEBRASKA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
David City	Butler	1,607	20	1909	30.1
Dawson	Richardson	945	16	1909	34.0
Duff	Rock	.....	10	1908	25.5
Edgar	Clay	1,722	15	1909	29.2
Ericson	Wheeler	2,029	14	1904	22.4
Ewing	Holt	1,888	17	1909	23.4
Fairbury	Jefferson	1,316	34	1909	30.4
Fairmont	Fillmore	1,641	16	1909	29.6
Franklin	Franklin	1,817	18	1909	23.8
Fremont	Dodge	1,203	29	1909	30.5
Fort Robinson	Dawes	3,764	25	1909	16.9
Fullerton	Nance	1,629	7	1909	31.2
Geneva	Fillmore	1,633	19	1909	30.1
Genoa	Nance	1,584	34	1909	27.9
Gering	Scottsbluff	3,902	18	1908	15.4
Gosper	Gosper	.....	7	1909	22.3
Gothenburg	Dawson	2,557	15	1909	23.5
Grand Island	Hall	1,861	18	1909	29.7
Greeley	Greeley	2,021	14	1909	23.6
Guiderock	Webster	1,546	9	1909	30.0
Haigler	Dundy	3,256	11	1902	17.8
Halsey	Thomas	2,695	7	1909	23.4
Hartington	Cedar	1,309	18	1909	29.0
Harvard	Clay	1,799	20	1909	27.3
Hastings	Adams	1,932	19	1909	27.7
Hayes Center	Hayes	.....	16	1909	22.8
Hay Springs	Sheridan	3,821	22	1909	20.1
Hebron	Thayer	1,458	24	1909	29.6
Holbrook	Furnas	.....	5	1906	25.8
Holdrege	Phelps	2,324	17	1909	25.9
Hooper	Dodge	1,228	12	1909	32.9
Imperial	Chase	3,278	19	1909	20.9
Kearney	Buffalo	2,147	19	1909	26.9
Kennedy	Cherry	.....	16	1906	23.0
Kimball	Kimball	4,697	20	1909	15.7
Kirkwood	Rock	.....	14	1909	25.2
Lexington	Dawson	2,385	20	1909	23.0
Lincoln	Lancaster	1,189	30	1909	27.5
Lodgepole	Cheyenne	3,820	8	1903	14.1
Loup	Sherman	2,067	15	1909	28.6
Lynch	Boyd	.....	14	1908	23.7
McCook	Redwillow	2,506	13	1907	20.8
McCool Junction	York	1,575	12	1909	30.9
Madison	Madison	1,585	15	1908	27.3
Madrid	Perkins	3,294	9	1901	14.4
Marquette	Hamilton	1,830	30	1909	27.0
Mason City	Custer	2,257	9	1909	27.5
Minden	Kearney	2,162	32	1909	31.3
Monroe	Platte	1,525	12	1909	28.4
Nebraska City	Otoe	961	31	1908	31.5
Nesbit	McPherson	.....	7	1901	17.9
Norfolk	Madison	1,532	26	1909	28.3
North Loup	Valley	1,961	21	1909	24.7
North Platte	Lincoln	2,821	35	1909	18.9
Oakdale	Antelope	1,722	22	1909	25.2
Odell	Gage	1,278	15	1909	33.0
Omaha	Douglas	1,103	39	1909	30.7
Ord	Valley	2,062	15	1909	24.8
O'Neil	Holt	1,975	11	1901	22.2
Ough	Dundy	.....	6	1896	15.7
Palmer	Merrick	1,796	18	1904	25.4
Palmyra	Otoe	1,142	14	1908	30.2
Pawnee City	Pawnee	1,175	14	1909	33.1
Plattsmouth	Cass	968	31	1904	31.6
Plymouth	Jefferson	1,419	5	1909	31.3
Purdum	Blaine	.....	9	1909	23.2
Ravenna	Buffalo	2,028	32	1909	25.7
Redcloud	Webster	1,687	17	1909	25.6
Republican	Harlan	1,939	6	1900	21.8
Rulo	Richardson	842	5	1900	34.7
St. Libory	Howard	1,887	15	1909	29.3
St. Paul	....do	1,813	15	1909	28.5
Santee	Knox	.....	21	1909	25.0
Schuyler	Colfax	1,357	16	1909	28.8

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

NEBRASKA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Scottsbluff	Scottsbluff	4,662	3	1909	16.5
Seneca	Thomas	2,971	7	1900	14.8
Seward	Seward	1,435	19	1909	31.2
Sidney	Cheyenne	4,090	[a] 17	1909	15.0
Springview	Keyapaha		16	1909	21.4
Stanton	Stanton	1,472	18	1909	27.5
Stratton	Hitchcock	2,804	12	1907	19.7
Superior	Nuckolls	1,570	24	1908	27.2
Syracuse	Otoe	1,059	32	1909	30.8
Tekamah	Burt	1,060	19	1909	32.3
Tablerock	Pawnee	1,023	21	1909	31.5
Tecumseh	Johnson	1,114	31	1909	32.1
Turlington	Otoe	1,224	17	1909	30.4
University Farm	Lancaster		24	1909	28.9
Valentine	Cherry	2,859	21	1909	22.5
Wahoo	Saunders	1,187	7	1909	35.3
Wakefield	Dixon	1,387	15	1909	28.9
Wauneta	Chase		11	1909	21.5
Weepingwater	Cass	1,080	32	1909	30.5
Westpoint	Cuming	1,313	23	1909	29.6
Whitman	Grant	3,588	11	1901	13.3
Wilber	Saline	1,325	15	1909	32.8
Wilsonville	Furnas	2,298	7	1901	21.6
Winnebago	Thurston		5	1905	30.0
Wisner	Cuming	1,380	14	1909	32.5
Wymore	Gage	1,222	6	1903	30.1
York	York	1,633	20	1909	29.1

NEVADA.

Austin	Lander	6,594	15	1903	11.6
Battle Mountain	....do	4,843	35	1905	7.1
Belmont	Nye	8,132	13	1904	10.5
Beowawe	Eureka	4,695	32	1902	6.4
Camp Halleck	Elko	5,671	14	1886	15.0
Camp McDermit	Humboldt	4,700	21	1888	13.2
Candelaria	Esmeralda	5,783	15	1904	5.0
Carlin	Elko	4,897	30	1900	6.5
Carson City	Ormsby	4,660	27	1906	12.3
Cedar Pass	Elko		7	1877	12.5
Cranes Ranch	....do	5,350	17	1904	10.0
Elko	....do	5,063	31	1901	6.9
Ely	White Pine	6,000	18	1908	12.3
Fernley	Lyon	4,200	2	1908	5.6
Golconda	Humboldt	4,697	30	1908	6.0
Halleck	Elko	5,631	16	1908	9.4
Harthorne	Esmeralda	4,569	17	1904	4.4
Hot Springs	Churchill	4,072	20	1889	3.5
Humboldt	Humboldt	4,236	35	1906	5.5
Iron Point	....do	4,375	8	1877	7.4
Lewers Ranch	Washoe	5,500	21	1908	26.1
Lovelock	Humboldt	3,977	10	1901	2.4
Martins Ranch	Douglas	4,830	6	1904	12.0
Mill City	Humboldt	4,225	17	1905	5.2
Otego	Elko		8	1886	8.0
Palisade	Eureka	4,821	21	1902	8.0
Palmetto	Esmeralda	6,780	18	1907	14.6
Pioche	Lincoln	6,110	9	1890	11.2
Potts	Nye	6,990	16	1908	7.5
Reno	Washoe	4,532	38	1908	10.4
Tecoma	Elko	4,812	31	1908	6.5
Tonopah	Nye	6,690	2	1908	10.2
Toano	Elko	5,975	33	1902	8.3
Tybo	Nye	6,500	10	1901	9.5
Verdi	Washoe	4,895	12	1901	15.8
Wadsworth	Washoe	4,077	32	1903	4.3
Wells	Elko	5,623	30	1901	9.1
Winnemucca	Humboldt	4,432	30	1908	8.4

[a] Except the months of January and February.

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

NEW MEXICO.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Agricultural College	Dona Ana	3,863	22	1908	9.1
Alamogordo	Otero	4,338	8	1908	10.9
Albert	Union	4,700	19	1908	16.3
Albuquerque	Bernalillo	5,200	33	1908	7.8
Alma	Socorro	5,500	11	1905	14.1
Aztec	San Juan	5,590	6	1900	8.4
Bell Ranch	San Miguel	4,500	10	1908	15.8
Bernalillo	Sandoval	5,200	5	1899	8.2
Bloomfield	San Juan	5,590	12	1908	8.5
Bluewater	Valencia	6,200	7	1902	9.5
Cambray	Luna	4,215	9	1908	8.4
Camp Burgwin	Taos	7,900	6	1860	8.6
Carlsbad	Eddy	3,120	14	1908	14.6
Chama	Rio Arriba	7,848	12	1908	23.3
Cliff	Grant	4,470	11	1908	14.9
Cloudcroft	Otero	8,650	7	1908	25.1
Deming	Luna	4,333	26	1908	8.9
Dorsey	Colfax	6,000	6	1908	15.4
Eagle Rock Ranch	Union	6,000	10	1907	18.3
East Las Vegas	San Miguel	6,450	14	1901	19.4
Eddy	Eddy	3,122	5	1898	12.8
Elk	Chaves		11	1908	21.6
Engle	Sierra	4,750	7	1901	10.4
Espanola	Rio Arriba	5,590	12	1908	9.5
Folsom	Union	6,000	5	1902	18.3
Fort Bayard	Grant	6,152	34	1908	14.6
Fort Craig	Socorro	4,619	24	1884	10.8
Fort Fillmore	Dona Ana	3,937	10	1861	8.0
Fort Selden	do	3,937	16	1890	8.6
Fort Stanton	Lincoln	6,231	30	1908	17.2
Fort Thorn	Dona Ana	4,500	6	1858	14.5
Fort Union	Mora	6,835	49	1908	19.4
Fort Wingate	McKinley	6,997	46	1908	14.3
Fruitland	San Juan	4,800	15	1908	5.1
Gage	Luna	4,486	10	1908	8.5
Galisteo	Santa Fe	6,074	8	1901	13.3
Gallinas Springs	San Miguel	5,272	18	1902	15.6
Gila	Grant	4,040	5	1899	14.6
Hillsboro	Sierra	5,224	14	1908	13.1
Las Cruces	Dona Ana	3,500	9	1897	8.8
Las Vegas	San Miguel	6,384	22	1908	19.3
Lava	Socorro	4,703	6	1890	10.8
Lordsburg	Grant	4,245	27	1908	8.5
Los Lunas	Valencia	4,900	18	1908	10.3
Lower Penasco	Chaves	5,250	5	1900	17.6
Lyons Ranch	Grant	4,040	6	1900	14.6
Mesilla Park	Dona Ana	3,868	21	1907	8.9
Mountainair	Torrance	6,547	7	1908	16.9
Puerto de Luna	Guadalupe	5,350	6	1898	17.2
Raton	Colfax	6,622	10	1904	12.7
Rincon	Dona Ana	4,031	11	1908	7.6
Roswell	Chaves	3,578	14	1908	15.8
San Marcial	Socorro	4,554	3	1899	8.5
San Rafael	Valencia	6,509	12	1908	11.9
Santa Fe	Santa Fe	7,013	36	1908	14.5
Shattucks	Eddy	6,000	3	1899	22.4
Socorro	Socorro	4,600	17	1908	10.7
Springer	Colfax	5,857	17	1908	13.9
Strauss	Dona Ana	4,080	8	1907	10.3
Taos	Taos	6,983	14	1908	12.7
White Oaks	Lincoln	6,470	4	1900	17.3
Winsors	San Miguel	8,200	13	1908	22.4

NORTH DAKOTA.

Amenia	Cass	954	12	1908	21.2
Ashley	McIntosh	2,007	13	1905	18.3
Berlin	Lamoure	1,470	14	1905	20.6
Berthold Agency	McLean	2,082	13	1908	16.0
Bismarck	Burleigh	1,674	34	1908	17.6
Bottineau	Bottineau	1,638	14	1908	15.7
Buxton	Traill	930	5	1902	16.5
Cando	Towner	1,488	7	1907	17.1

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

NORTH DAKOTA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Churchs Ferry	Ramsey	1,458	10	1904	23.0
Coal Harbor	McLean	1,901	13	1908	16.9
Devils Lake	Ramsey	1,482	4	1908	20.2
Dickinson	Stark	2,543	17	1908	15.0
Donnybrook	Ward	1,760	9	1907	12.3
Dunseith	Rolette	.....	12	1908	14.9
Edgeley	Lamoure	1,468	8	1908	19.5
Ellendale	Dickey	1,449	12	1904	16.3
Fargo	Cass	903	15	1906	19.4
Forman	Sargent	1,249	12	1905	19.4
Fort Yates	Morton	1,670	26	1907	16.3
Fullerton	Dickey	1,439	11	1908	22.1
Gallatin	Griggs	.....	9	1902	17.7
Glenullin	Morton	2,070	10	1905	13.3
Grafton	Walsh	827	16	1906	16.8
Hamilton	Pembina	824	9	1905	22.0
Jamestown	Stutsman	1,390	22	1908	20.0
Larimore	Grand Forks	1,134	11	1905	17.2
McKinney	Ward	1,640	15	1908	15.4
Mayville	Traill	975	13	1908	21.1
Medora	Billings	2,225	13	1908	13.2
Melville	Foster	1,590	12	1908	16.0
Milton	Cavalier	1,586	10	1902	16.8
Minot	Ward	1,557	11	1908	16.5
Minto	Walsh	820	16	1908	18.8
Minnewaukon	Benson	1,459	7	1904	17.6
Moorhead, Minn	Clay	940	29	1908	24.9
Napoleon	Logan	1,955	18	1908	19.1
New England	Hettinger	2,400	13	1908	12.7
Oakdale	Dunn	.....	12	1906	16.1
Pembina	Pembina	789	11	1908	19.8
Portal	Ward	1,954	13	1906	14.2
Power	Richland	1,020	17	1908	20.6
Steele	Kidder	1,857	13	1907	15.7
University	Grand Forks	830	17	1908	20.5
Wahpeton	Richland	962	13	1904	27.3
Williston	Williams	1,875	29	1908	15.1
Willow City	Bottineau	1,471	15	1907	14.5
Woodbridge	Cavalier	.....	10	1902	22.7

OKLAHOMA.

Arapaho	Custer	1,575	15	1908	29.0
Ardmore	Carter	872	4	1908	38.9
Beaver	Beaver	2,500	9	1908	19.7
Blackburn	Pawnee	800	8	1908	46.5
Burnett	Pottawatomie	1,200	11	1902	33.0
Chandler	Lincoln	865	7	1908	38.5
Chickasha	Grady	1,091	9	1908	31.9
Cloud Chief	Washita	1,400	7	1908	32.0
Dacoma	Woods	1,337	11	1908	28.7
Durant	Bryan	643	7	1908	43.3
Enid	Garfield	1,269	10	1908	32.5
Fairland	Ottawa	839	9	1908	42.2
Fort Reno	Canadian	1,400	21	1908	30.4
Fort Sill	Comanche	1,200	37	1908	30.9
Fort Smith (Ark.)	Sebastian	457	28	1908	44.7
Gage	Ellis	2,136	6	1908	28.2
Guthrie	Logan	1,000	16	1908	33.2
Harrington	Roger Mills	.....	5	1908	30.7
Hartshorne	Pittsburg	700	10	1908	44.3
Healdton	Carter	900	18	1908	37.1
Hennessey	Kingfisher	1,166	12	1908	31.5
Hobart	Kiowa	1,396	6	1908	31.7
Holdenville	Hughes	900	8	1908	43.2
Hopeton	Woods	.....	2	1899	29.4
Jefferson	Grant	1,062	15	1908	30.4
Jenkins	Woods	1,337	8	1905	27.0
Kenton	Cimarron	4,000	8	1908	15.5
Kingfisher	Kingfisher	1,046	11	1908	35.8
Lehigh	Coal	593	8	1900	34.9
McAlester	Pittsburg	698	13	1908	46.0
McComb	Pottawatomie	1,200	17	1908	34.0

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

OKLAHOMA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Mangum	Greer	1,585	17	1908	28.2
Marlow	Stephens	1,292	8	1908	37.1
Meeker	Lincoln	1,030	15	1908	34.6
Muskogee	Muskogee	614	10	1908	38.0
Newkirk	Kay	1,149	11	1908	36.4
Norman	Cleveland	1,180	14	1908	33.6
Oklahoma	Oklahoma	1,247	18	1908	32.8
Okmulgee	Okmulgee	752	7	1908	41.2
Pawhuska	Osage	918	10	1908	42.3
Perry	Noble	920	9	1908	36.1
Prudence	Major		6	1900	32.9
Ravia	Johnston	796	6	1908	42.1
Sac and Fox Agency	Lincoln	900	16	1908	34.5
Shawnee	Pottawatomie	1,041	7	1908	38.9
South McAlester	Choctaw Nation	698	13	1905	45.3
Stillwater	Payne	880	16	1908	35.2
Temple	Comanche	925	6	1908	34.5
Tulsa (1)	Tulsa	700	20	1908	35.9
Tahlequah	Cherokee	790	9	1902	42.5
Taloga	Dewey		4	1903	24.4
Vinita	Craig	698	6	1908	45.3
Vittum	Logan	940	8	1900	30.0
Wagoner	Wagoner	588	12	1908	39.0
Waukomis	Garfield	1,258	12	1908	31.6
Weatherford	Custer	1,639	8	1908	28.9
Webbers Falls	Muskogee	479	11	1908	40.7
Whiteagle	Kay	945	6	1908	41.9
Winnview	Blaine		7	1899	28.1
Woodward	Woodward	2,300	6	1901	18.2

OREGON.

Albany	Linn	214	32	1908	44.7
Alpha	Lane	250	7	1906	87.1
Arlington	Gilliam	855	14	1904	9.1
Ashland	Jackson	1,940	21	1908	20.1
Astoria	Clatsop	11	49	1908	74.5
Aurora	Marion	144	10	1901	46.7
Baker City	Baker	3,464	20	1908	12.8
Bandon	Coos	55	27	1899	68.6
Bay City	Tillamook	225	14	1908	108.3
Bend	Crook		6	1907	13.7
Beulah	Malheur	3,269	14	1905	10.7
Blalock	Gilliam	237	10	1908	10.4
Brownsville	Linn	346	11	1902	36.9
Buckhorn Farm	Josephine	1,300	10	1908	70.3
Bull Run	Clackamas	719	10	1907	76.3
Burns	Harney	4,157	19	1908	10.5
Cascade Locks	Hood River	100	30	1908	79.0
Comstock	Douglas	473	11	1902	36.8
Coquille River Light-House	Coos	13	10	1907	57.5
Corvallis	Benton	319	20	1908	41.8
Dayville	Grant	1,500	14	1908	12.5
Doraville	Columbia	600	7	1908	49.4
Drain	Douglas	300	6	1908	47.8
Ella	Morrow		11	1909	9.0
Eugene	Lane	449	18	1908	37.9
Fairview	Coos	142	11	1908	70.8
Falls City	Polk	355	11	1907	82.7
Forest Grove	Washington	220	17	1906	49.0
Gardiner	Douglas	72	20	1908	79.3
Glenora	Tillamook	575	17	1908	117.6
Gold Beach	Curry	40	6	1908	88.5
Government Camp	Clackamas	3,580	11	1906	89.3
Grants Pass	Josephine	956	20	1908	44.8
Happy Valley	Harney	4,200	10	1899	13.2
Hare	Curry	1,342	10	1901	99.7
Headworks	Clackamas	719	10	1908	82.2
Heppner	Morrow	1,950	20	1908	15.5
Hood River	Hood River	243	24	1907	36.4
Huntington	Baker	2,110	7	1907	12.9
Irvington	Multnomah	75	12	1899	32.5
Jacksonville	Jackson	1,640	20	1908	27.2

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

OREGON—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Joseph	Wallowa	4,400	19	1908	18.2
Junction City	Lane	353	11	1902	33.6
Klamath Falls	Klamath	4,250	14	1908	14.0
Lafayette	Yamhill	182	11	1902	42.9
La Grande	Union	2,784	21	1908	19.5
Lakeview	Lake	4,825	23	1907	16.9
Langlois	Curry	250	9	1899	101.8
Lone Rock	Gilliam	3,114	18	1905	14.6
McKenzie Bridge	Lane	1,400	8	1908	72.2
McMinnville	Yamhill	180	21	1908	47.8
Marshfield	Coos	12	6	1907	66.7
Merlin	Josephine	934	10	1901	34.9
Miramonte Farm	Clackamas	195	17	1908	43.5
Monmouth	Polk	221	11	1902	39.6
Monroe	Benton	350	11	1908	39.9
Mount Angel	Marion	485	23	1908	46.0
Nehalem	Tillamook	10	13	1907	111.9
Newberg	Yamhill	193	9	1902	47.9
New Bridge	Baker	1,900	9	1900	9.6
Newport	Lincoln	69	19	1908	56.3
Pendleton	Umatilla	1,272	19	1908	14.2
Placer	Josephine		4	1901	39.2
Pompeii	Clackamas	3,580	13	1908	85.4
Portland	Multnomah	57	37	1908	46.0
Prineville	Crook	3,000	11	1907	8.8
Riddle	Douglas	733	11	1902	29.8
Riverside	Malheur		5	1901	8.7
Roseburg	Douglas	523	32	1908	34.0
Salem	Marion	120	17	1908	40.5
Sheridan	Yamhill	207	11	1902	43.0
Silver Lake	Lake	4,700	12	1907	10.4
Silverton	Marion	255	11	1902	45.2
Siskiyou	Jackson	4,135	11	1902	29.2
Sparta	Baker	4,150	15	1906	23.9
Springfield	Lane	476	9	1900	39.1
Stafford	Clackamas		13	1908	32.4
The Dalles	Wasco	112	34	1908	14.2
Toledo	Lincoln	50	19	1908	79.4
Umatilla	Umatilla	340	22	1908	8.6
Vale	Malheur	2,450	17	1908	10.2
Vernonia	Columbia	1,238	11	1899	62.1
Wallowa	Wallowa	2,935	7	1909	17.2
Warmsprings	Crook	1,600	6	1907	11.5
West Fork	Douglas	1,046	11	1901	41.2
Weston	Umatilla	1,800	19	1908	24.5
Williams	Josephine	1,368	15	1906	33.5

SOUTH DAKOTA.

Aberdeen	Brown	1,300	19	1908	26.9
Academy	Charles Mix		10	1908	22.5
Alexandria	Hanson	1,352	22	1908	24.6
Armour	Douglas	1,521	14	1908	24.6
Ashcroft	Harding	3,192	17	1908	14.0
Bowdle	Edmunds	1,995	14	1908	19.3
Brookings	Brookings	1,636	20	1908	26.0
Canton	Lincoln	1,248	12	1906	26.3
Centerville	Turner	1,229	12	1908	27.1
Chamberlain	Brule	1,363	12	1908	17.9
Chandler (Academy)	Charles Mix		1	1899	19.8
Cherry Creek	Armstrong		13	1907	14.0
Clark	Clark	1,779	17	1908	22.6
De Smet	Kingsbury	1,726	16	1907	21.7
Ella Point	Union	1,127	8	1906	29.0
Farmingdale	Pennington	3,000	11	1905	13.9
Faulkton	Faulk	1,595	14	1908	19.5
Flandreau	Moody	1,565	19	1908	24.5
Forestburg	Sanborn	1,231	16	1907	21.2
Forest City	Potter		6	1899	15.7
Fort Meade	Meade	3,624	28	1907	19.8
Gannvalley	Buffalo		8	1905	20.7
Gary	Deuel	1,484	9	1900	22.6
Grand River School	Corson		2	1901	14.5

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

SOUTH DAKOTA—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Greenwood	Charles Mix		15	1908	23.7
Harney	Pennington	5,000	9	1898	18.4
Hartman	Minnehaha	1,474	4	1901	20.9
Highmore	Hyde	1,890	16	1908	17.4
Hotch City	Lyman		13	1905	14.5
Hot Springs	Fall River	3,447	4	1900	12.5
Howard	Miner	1,564	17	1908	21.8
Howell	Hand		7	1908	18.2
Huron	Beadle	1,306	27	1908	21.1
Ipswich	Edmunds	1,530	11	1907	22.6
Kidder	Marshall	1,295	5	1908	22.4
Kimball	Brule	1,788	23	1908	19.3
La Delle	Spink	1,400	12	1908	26.2
Leola	McPherson	1,587	6	1905	19.7
Marion	Turner	1,447	8	1908	26.5
Melette	Spink	1,300	14	1908	20.3
Menno	Hutchinson	1,325	12	1908	24.4
Milbank	Grant	1,148	18	1908	22.4
Mitchell	Davison	1,312	15	1908	23.2
Mound City	Campbell		1	1901	24.8
Nowlin	Stanley		4	1898	9.7
Oelrichs	Fall River	3,339	18	1908	19.4
Parker	Turner	1,348	9	1900	22.9
Pierre	Hughes	1,572	17	1908	16.6
Pine Ridge	Shannon		1	1901	13.1
Plankington	Aurora	1,528	15	1908	21.1
Ramsey	McCook	1,474	8	1905	23.1
Rapid City	Pennington	3,251	21	1908	18.7
Redfield	Spink	1,295	11	1908	20.1
Rosebud	Meyer	2,600	15	1908	18.3
St. Lawrence	Hand	1,580	4	1901	18.7
Silver City	Pennington	5,000	9	1903	20.6
Sioux Falls	Minnehaha	1,400	18	1908	25.1
Sisseton Agency	Roberts		5	1904	25.5
Spearfish	Lawrence	3,647	19	1908	22.6
Stephan	Hyde	1,840	5	1908	18.1
Tyndall	Bonhomme	1,418	14	1906	23.6
Vermillion	Clay	1,420	8	1908	29.7
Watertown	Codington	1,735	15	1908	22.6
Waubay	Day	1,813	3	1901	21.3
Wentworth	Lake		16	1908	22.6
Wessington Springs	Jerauld	1,335	8	1899	20.2
White Swan	Charles Mix		5	1898	20.9
Wolsey	Beadle	1,353	15	1907	20.1
Yankton	Yankton	1,234	35	1908	25.4

TEXAS.

Abilene	Taylor	1,738	24	1908	24.7
Albany	Shackelford	1,429	15	1908	27.2
Alvin	Brazoria	49	8	1905	52.1
Amarillo	Potter	3,676	17	1908	22.6
Arthur City	Lamar	590	15	1905	36.1
Austin	Travis	650	23	1908	34.4
Ballinger	Runnels	1,637	14	1908	25.0
Beaumont	Jefferson	29	12	1908	41.9
Beeville	Bee	225	13	1908	29.6
Big Springs	Howard	2,396	7	1908	20.4
Blanco	Blanco	1,350	12	1907	29.6
Boerne	Kendall	1,412	16	1907	29.8
Bonham	Fannin	566	6	1908	47.6
Booth	Fort Bend	81	8	1908	43.3
Bowie	Montague	1,113	9	1908	27.9
Brazoria	Brazoria	25	18	1908	47.5
Brenham	Washington	350	20	1908	41.5
Brighton	Nueces	12	13	1908	23.3
Brownsville	Cameron	38	20	1908	27.1
Brownwood	Brown	1,342	12	1903	27.5
Burnet	Burnet	1,295	15	1904	28.3
Childress	Childress	1,869	15	1907	21.4
Coleman	Coleman	1,710	15	1908	27.6
College Station	Brazos	360	19	1907	38.4
Colorado	Mitchell	2,066	18	1908	22.0

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

TEXAS—Continued.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Columbia	Brazoria	34	20	1908	43.8
Corpus Christi	Nueces	20	22	1908	27.2
Corsicana	Navarro	495	23	1908	37.9
Cuero	Dewitt	177	20	1908	34.1
Dallas	Dallas	466	10	1908	35.5
Danevang	Wharton	145	13	1908	45.9
Del Rio	Valverde	952	3	1908	26.8
Dialville	Cherokee	575	7	1904	41.6
Dublin	Erath	1,466	14	1908	29.2
Duval	Travis	820	20	1908	30.8
Eagle Pass	Maverick	800	20	1908	21.6
El Paso	El Paso	3,762	30	1908	9.8
Estelle	Dallas	614	11	1904	32.1
Forestburg	Montague	.....	6	1903	33.9
Fort Brown	Cameron	57	16	1905	20.6
Fort Clark	Kinney	1,050	22	1908	22.7
Fort Davis	Jeff Davis	5,000	10	1905	14.0
Fort McIntosh	Webb	460	22	1907	17.8
Fort Ringgold	Starr	230	20	1905	16.8
Fort Stockton	Pecos	3,050	26	1908	15.9
Fort Worth	Tarrant	670	13	1908	26.9
Fredericksburg	Gillespie	1,742	20	1908	28.4
Gainesville	Cooke	738	20	1908	37.3
Galveston	Galveston	69	38	1908	47.1
Grapevine	Tarrant	670	19	1908	36.3
Georgetown	Williamson	750	14	1908	35.5
Greenville	Hunt	550	9	1908	42.1
Hale Center	Hale	3,000	12	1905	21.2
Halletsville	Lavaca	235	18	1908	33.2
Haskell	Haskell	1,553	14	1905	21.6
Hearne	Robertson	305	17	1905	34.1
Henrietta	Clay	915	11	1905	26.9
Hewitt	McLennan	664	15	1908	36.7
Hondo City	Medina	901	13	1908	28.1
Houston	Harris	53	20	1908	48.4
Huntsville	Walker	400	21	1908	45.2
Kaufman	Kaufman	448	7	1908	44.4
Kent	El Paso	.....	12	1903	12.2
Kerrville	Kerr	1,650	14	1908	29.8
Kopperl	Bosque	576	18	1908	33.5
Lampasas	Lampasas	1,026	18	1908	29.5
La Para	Live Oak	.....	.....	1903	21.9
Llano	Llano	1,040	17	1907	22.4
Longview	Gregg	336	20	1908	47.1
Luling	Caldwell	418	20	1908	29.2
McKinney	Collin	612	6	1904	32.8
Menardville	Menard	1,900	16	1904	21.9
Mount Blanco	Crosby	2,750	23	1908	21.3
Nacogdoches	Nacogdoches	271	10	1908	51.2
New Braunfels	Comal	720	18	1906	29.4
Palestine	Anderson	510	27	1908	43.0
Panter	Hood	1,000	17	1905	32.5
Paris	Lamar	592	20	1908	34.6
Port Lavaca	Calhoun	20	8	1908	41.1
Rhineland	Knox	.....	11	1906	23.4
Rock Island	Colorado	254	8	1906	41.3
Runge	Karnes	308	14	1908	30.2
San Antonio (1)	Bexar	701	24	1908	26.8
San Marcos	Hays	588	16	1908	31.3
San Saba	San Saba	1,712	5	1908	23.4
Santa Gertrudes	Nueces	.....	7	1908	24.1
Sherman	Grayson	728	15	1907	34.2
Sonora	Sutton	2,200	6	1908	23.6
Sugarland	Fort Bend	79	11	1908	44.2
Sulphur Springs	Hopkins	530	16	1907	39.0
Taylor	Williamson	583	8	1908	35.5
Temple (1)	Bell	630	15	1908	34.9
Texarkana	Bowie	295	10	1905	37.2
Tulia	Swisher	3,501	11	1908	27.0
Tyler	Smith	531	17	1905	38.4
Victoria	Victoria	187	17	1908	36.5
Waco	McLennan	424	20	1908	36.9
Waxahachie	Ellis	556	13	1908	35.4
Weatherford	Parker	864	20	1908	31.2
Wichita Falls	Wichita	958	14	1904	28.8

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

UTAH.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Alpine	Utah	4,900	9	1905	16.4
Aneth	San Juan	4,800	5	1905	6.7
Annabelle (near)	Sevier	5,250	4	1909	13.7
Beaver	Beaver	6,000	6	1909	13.6
Black Rock	Millard	4,872	4	1904	8.4
Blue Creek	Boxelder	4,387	26	1903	8.4
Brigham	do	4,379	5	1899	18.8
Camp Douglas	Salt Lake	4,800	22	1890	17.4
Castle Dale	Emery	5,500	10	1909	7.4
Castle Rock	Summit	6,244	6	1909	16.1
Coalville	do	5,630	8	1882	13.7
Corinne	Boxelder	4,240	39	1909	12.3
Deseret	Millard	4,541	15	1909	7.9
Emery	Emery	6,260	8	1908	4.1
Escalante	Garfield	5,700	9	1909	11.2
Farmington	Davis	4,267	9	1909	21.0
Fillmore	Millard	5,100	19	1909	14.1
Fort Duchesne	Uinta	5,000	21	1909	7.1
Frisco	Beaver	7,318	15	1909	8.1
Garrison	Millard		6	1909	6.6
Giles	Wayne	4,000	10	1905	5.1
Government Creek	Tooele	5,277	9	1909	14.0
Grantville (near)	do		4	1909	13.6
Grayson	San Juan	5,750	5	1909	20.9
Green River	Emery	4,080	11	1908	4.7
Grover (near)	Wayne	5,800	8	1903	6.8
Heber	Wasatch	5,606	16	1909	17.0
Henefer	Summit	5,301	10	1909	18.2
Hite	Garfield	3,000	10	1909	6.7
Huntsville	Weber	5,100	14	1909	20.4
Kelton	Boxelder	4,230	31	1909	6.2
Levan	Juab	5,010	19	1909	16.0
Loa	Wayne	7,000	17	1909	6.6
Logan	Cache	4,507	18	1909	15.5
Manti	Sanpete	5,575	15	1909	12.0
Marion	Summit	6,750	5	1909	21.6
Marysvale (near)	Piute	6,180	10	1909	11.6
Meadowville	Rich	6,200	10	1907	14.7
Millville	Cache	4,848	14	1909	18.0
Minersville	Beaver	5,070	10	1907	9.7
Moab	Grand	4,000	20	1909	8.3
Modena	Iron	5,479	9	1909	10.2
Morgan	Morgan	5,080	6	1909	20.2
Mount Nebo	Utah	4,650	8	1909	10.0
Mount Pleasant	Sanpete	5,859	12	1904	12.4
Nephi	Juab	6,059	6	1909	17.2
Nephi (near)	do			1909	18.1
Ogden (1)	Weber	4,310	8	1909	21.0
Ogden (2)	do	4,310	38	1908	13.9
Pahreah	Kane	4,000	5	1899	9.6
Park City	Summit	7,800	5	1901	19.0
Parowan	Iron	5,970	18	1909	12.4
Payson	Utah	4,637	6	1909	20.1
Pinto	Washington	5,907	12	1909	15.1
Promontory	Boxelder		21	1890	7.6
Provo	Utah	4,532	17	1909	13.4
Ranch	Kane	6,700	8	1909	23.1
Randolph	Rich	6,442	6	1909	11.2
Richfield	Sevier	5,350	19	1909	7.4
St. George	Washington	2,880	22	1908	6.8
Salt Lake City	Salt Lake	4,366	35	1909	16.0
Scipio	Millard	5,260	14	1909	14.7
Snowville	Boxelder	4,360	18	1908	10.9
Soldiers Summit	Utah	7,474	12	1904	14.1
Terrace	Boxelder	4,550	34	1903	4.7
Thistle	Utah	5,075	16	1908	12.9
Tooele	Tooele	4,900	13	1909	15.7
Tropic	Garfield	7,000	12	1909	10.2
Vernal (near)	Uinta	5,050	14	1909	9.5
Woodruff	Rich	6,500	10	1907	8.5

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

WASHINGTON.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Aberdeen	Chehalis	162	17	1907	86.9
Anacortes	Skagit	60	15	1908	28.0
Ashford	Pierce	1,775	12	1906	71.8
Bellingham	Whatcom	60	14	1908	31.5
Blaine	do	53	12	1908	42.8
Bremerton	Kitsap		10	1908	43.9
Brinnon	Jefferson	80	8	1906	75.5
Cedonia	Stevens	3,000	12	1905	20.4
Centralia	Lewis	212	16	1908	46.6
Cheney	Spokane	2,351	10	1908	17.2
Clearwater	Jefferson	135	12	1907	127.6
Cle Elum	Kittitas	1,930	10	1908	26.7
Colfax	Whitman	2,300	20	1908	23.0
Colville	Stevens	1,635	9	1908	17.8
Conconully	Okanogan	2,300	9	1908	16.7
Coupeville	Island	150	13	1908	21.7
Crescent	Lincoln	2,250	8	1907	17.8
Cusick	Stevens	2,050	7	1905	23.9
Dayton	Columbia	1,700	23	1908	23.2
East Sound	San Juan	500	14	1908	31.8
Ellensburg	Kittitas	1,571	21	1908	9.9
Fort Canby	Pacific	179	30	1898	54.1
Fort Simcoe	Yakima		11	1898	9.3
Fort Spokane	Lincoln	1,400	15	1898	13.9
Grand Mound	Thurston	162	9	1903	52.6
Granite Falls	Snohomish	397	6	1905	60.3
Hooper	Whitman	1,083	5	1903	12.4
Hunters	Stevens		5	1898	20.4
Kennewick	Benton	367	12	1906	6.7
La Center	Clarke	250	12	1908	55.0
Lakeside	Chelan	1,116	18	1908	12.7
Lapush	Clallam	15	5	1898	85.8
Lind	Adams	1,700	9	1905	11.8
Loomis	Okanogan	1,200	9	1905	13.7
Lyle	Klickitat	600	15	1907	26.3
Madrone	Kitsap	75	21	1898	44.5
Mayfield	Lewis	300	9	1902	65.9
Mottingers Ranch	Benton	307	9	1908	9.3
Mount Pleasant	Skamania	650	9	1908	55.5
Moxee (North Yakima)	Yakima	1,000	17	1908	8.9
Neah Bay	Clallam	50	20	1901	116.7
North Head	Pacific	211	7	1908	45.8
North Port	Stevens	1,950	10	1908	20.8
Olga	San Juan	50	19	1908	30.3
Olympia	Thurston	200	31	1908	55.2
Pasco	Franklin	360	1	1901	6.5
Pomeroy	Garfield	1,500	15	1908	19.0
Port Crescent	Clallam	259	14	1908	42.2
Port Townsend	Jefferson	80	19	1908	20.6
Pullman (Agricultural College)	Whitman	2,550	17	1908	22.4
Republic	Ferry	2,628	9	1908	18.0
Ritzville	Adams	1,825	10	1909	9.8
Rosalia	Whitman	2,375	16	1907	20.2
Seattle	King	123	18	1908	36.7
Sedro-Woolley	Skagit	38	12	1908	46.8
Silvana	Snohomish	35	10	1903	36.4
Snohomish	do	50	14	1907	45.2
Snoqualmie Falls	King	667	10	1908	59.5
South Bend	Pacific	16	14	1908	90.5
South Ellensburg	Kittitas	1,570	11	1904	9.3
Spokane	Spokane	1,943	28	1908	18.9
Sprague	Lincoln	1,908	6	1904	15.1
Sunnyside	Yakima	764	12	1906	6.6
Tacoma	Pierce	213	23	1908	45.4
Tatoosh	Clallam	86	23	1908	88.8
Twin	do	6	2	1900	66.5
Union City	Mason	10	14	1906	83.4
Vancouver	Clarke	100	34	1908	38.7
Vashon Island	King	110	20	1908	42.0
Walla Walla	Wallawalla	1,000	23	1908	17.7
Waterville	Douglas	2,624	18	1907	13.2
Wenatchee (near)	Chelan	1,169	10	1908	15.5
Whatcom	Whatcom	60	9	1903	31.9
Wilbur	Lincoln	2,203	10	1908	15.2

TABLE VI.—*Normal precipitation of stations in the western United States grouped according to States*—Continued.

WYOMING.

Station.	County.	Elevation.	Number of years recorded.	Record ended—	Normal precipitation.
		Feet.			*Inches.*
Afton	Uinta	6,200	4	1906	18.2
Alcova	Natrona	5,366	6	1904	9.4
Barnum	Johnson	5,500	3	1907	12.0
Basin	Big Horn	3,862	11	1909	5.8
Bedford	Uinta	5,906	9	1907	18.4
Border	do	6,085	8	1909	14.1
Buffalo	Johnson	4,635	16	1907	10.9
Centennial	Albany	8,700	4	1902	16.9
Cheyenne	Laramie	6,088	39	1909	13.6
Chugwater	do	5,282	9	1909	16.0
Clark	Park	4,320	3	1907	11.6
Daniel	Uinta	6,740	11	1909	11.6
Elk Mountain	Carbon		3	1907	18.8
Evanston	Uinta	6,860	14	1909	14.0
Fort Laramie	Laramie	4,270	33	1909	12.2
Fort Washakie	Fremont	5,462	22	1905	12.3
Fourbear	Big Horn	6,500	11	1903	11.3
Granite Canon	Laramie	7,373	3	1907	16.9
Granite Springs Reservation	do		2	1907	16.8
Green River	Sweetwater	6,083	3	1907	8.5
Griggs	Johnson	4,700	7	1907	14.4
Iron Mountain	Laramie	6,605	4	1902	11.6
Kaycee	Johnson		8	1908	14.8
Kirtley	Converse		4	1907	16.3
Lander	Fremont	5,372	18	1909	13.9
Laramie	Albany	7,188	19	1909	10.2
Leo	Carbon	6,878	9	1909	9.8
Lolabama Ranch	Park	7,052	5	1906	11.8
Lusk	Converse	5,007	20	1909	14.0
Moorcroft	Crook	4,211	5	1907	15.1
Moore	Albany	6,000	7	1907	14.8
Pathfinder	Natrona	5,735	4	1909	9.7
Phillips	Laramie	4,900	6	1908	17.4
Pine Bluff	do	5,038	9	1908	15.0
Rawlins	Carbon	6,744	8	1907	11.3
Rock Springs	Sweetwater	6,500	8	1902	6.9
Saratoga	Carbon	7,300	11	1907	13.5
Sheridan (1)	Sheridan	3,790	15	1909	15.0
Sheridan (2)	do	3,738	15	1909	15.0
Soldiers' Home	Johnson	4,635	18	1909	11.3
South Pass City	Fremont	7,873	6	1905	14.8
Thayne	Uinta	5,900	7	1905	14.8
Thermopolis	Fremont	4,700	5	1903	12.1
Wells	Uinta	7,785	3	1906	17.7
Wheatland	Laramie	4,741	12	1906	13.1
Yellowstone Park	National Park	6,200	22	1909	18.8

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